Public Works Department
Bombay Presidency

Irrigation Administration Report

Part II—Sind

For the Year 1929-30

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LLOYD BARRAGE – SUKKUR

Panoramic view of Barrage as seen from the roof of S.E.L.B.C's Bungalow. Cofferdam partly removed.

CONTENTS

	PAGES
Statement showing expenditure on establishment in the Roads and Buildings and the Irrigation Branches	At the beginning of the Report.
Description of Irrigation	1
1. Nature of Inundation and Rainfall	1–2
2. Indus Right Bank Circle—	
A. General Review of the results of the year 1929-30	2–11
B. Details of different works or groups of works and a comparison of the agricultural and financial results of the year 1929-30 with those of the previous year and the average of the last triennium, etc.—	
(a) Works for which capital accounts are kept	11–25
(b) Works for which capital accounts are not kept	25–27
3. Indus Left Bank Circle—	
A. General Review of the results of the year 1929-30	27–37
B. Details of different works or groups of works and a comparison of the agricultural and financial results of the year 1929-30 with those of the previous year and the average of the last triennium, etc.—	
(a) Works for which capital accounts are kept	37–48
(b) Works for which capital accounts are not kept	48–50
4. Lloyd Barrage and Canals Construction—	
General Remarks	50–51
Lloyd Barrage Circle	51–52
Canal Circles	52
General Items	52
5. Indus River Commission	53–56
Commissioner in Sind's Review	57–60
Government Resolution reviewing the report	61–63

LIST OF DIAGRAMS, ILLUSTRATIONS AND MAPS

DIAGRAMS

Diagram showing expenditure on irrigation works from loan funds and revenue .. .. } At the beginning
Diagram showing expenditure on establishment in the Roads and Buildings and Irrigation Branches .. } of the Report.

Diagram showing working Record for Jamrao Canal up to 1930 .. .. Facing page 44.

Diagram showing financial Record for Jamrao Canal .. Facing page 44.

ILLUSTRATIONS

Lloyd Barrage—Sukkur—

Panoramic view of Barrage as seen from the roof of S. E., L. B. C.'s Bungalow. Cofferdam partly removed .. .. .. At the beginning of the Report.

Fuleli Canal—

Group Regulators at mile 71 .. .. Facing page 42.

Lloyd Barrage—

View of the work inside the Barrage cofferdam of season 1929-30 .. .. .. Facing page 50.

Lloyd Barrage—Sukkur—

Panoramic view inside the cofferdam looking downstream. Showing in progress masonry floor and aprons of Barrage and piers for the last 27 spans in the centre of River .. .. Facing page 52.

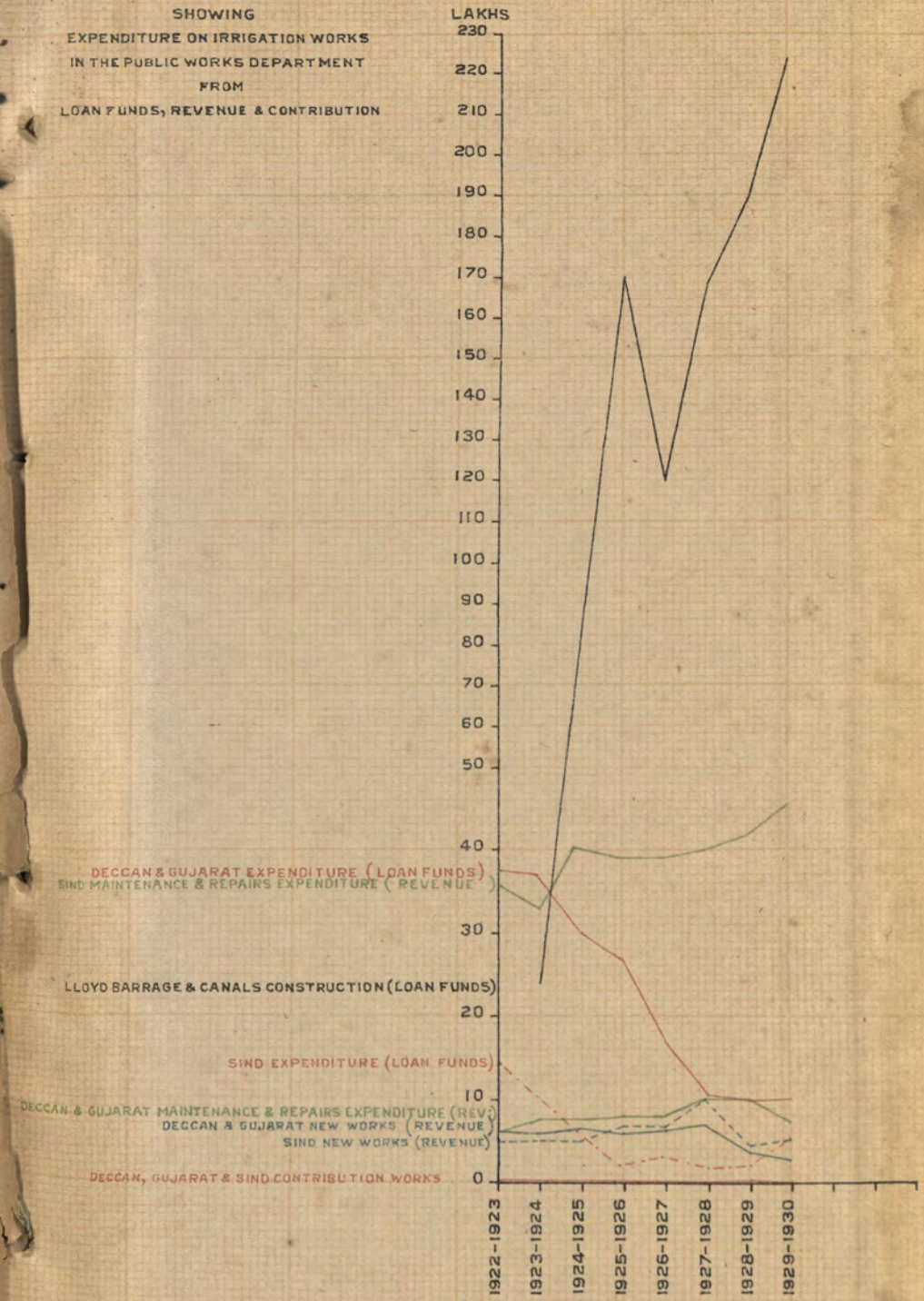
Panoramic view inside cofferdam looking downstream. All floor masonry and aprons upstream and downstream completed, and piers built up to flood level .. .. .. Facing page 52.

MAPS

Index Map of Sind .. .. .. } At end of Report.
Map of Sind showing all areas irrigated by existing inundation canals .. .. .. } At end of Report.
Plan of Sind showing all areas to be irrigated by Lloyd Barrage and New Canals .. .. } At end of Report.

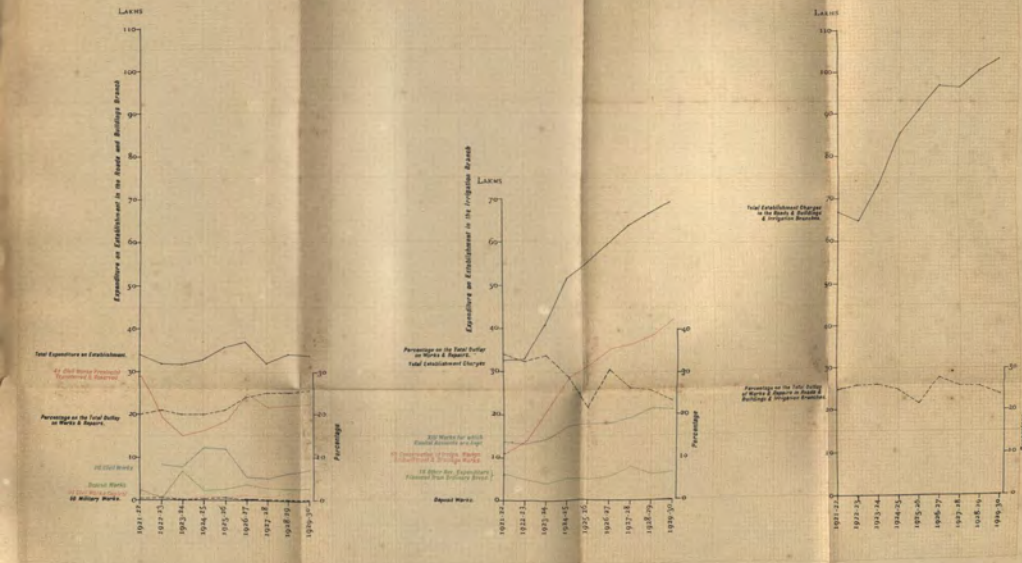
DIAGRAM

SHOWING
EXPENDITURE ON IRRIGATION WORKS
IN THE PUBLIC WORKS DEPARTMENT
FROM
LOAN FUNDS, REVENUE & CONTRIBUTION



G.P.Z.O. Poona, 1931.

DIAGRAM SHOWING EXPENDITURE
ON ESTABLISHMENT
IN THE
ROADS & BUILDINGS & IRRIGATION BRANCHES
OF THE
PUBLIC WORKS DEPARTMENT
AND
PERCENTAGES TO THE TOTAL OUTLAY ON WORKS AND REPAIRS.


Lakhs
Expenditure on Establishment in the Roads and Buildings Branch
Total Expenditure on Establishment.
Percentage on the Total Outlay on Works & Repairs.
Percentage
Lakhs
Expenditure on Establishment in the Irrigation Branch
Percentage on the Total Outlay on Works & Repairs.
Total Establishment Charges
Percentage
Lakhs
Total Establishment Charges in the Roads & Buildings & Irrigation Branches.
Percentage on the Total Outlay on Works & Repairs in Roads & Buildings & Irrigation Branches.
Percentage

Surv. Photozincographic Dep., Poona, 1931.

Statement showing expenditure on establishment in the Roads and Buildings and the Irrigation Branches of the P. W. D. from the year 1921-22 to 1929-30 and percentage on the total outlay on works and repairs during that period in both the Branches

Year	Expenditure on establishment in the Roads and Buildings Branch						
	41—Civil Works—Provincial (Transferred and Reserved)	60—Civil Works	41—Civil Works—Central	50—Military Works	Deposit Works	Total	Percentage on the total outlay on works and repairs in the Roads and Buildings Branch
1	2	3	4	5	6	7	8
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1921-22 ..	29,05,955	....	1,98,683	45,258	2,84,992	34,35,888	19·26
1922-23 ..	20,14,640	8,34,450	1,78,163	71,481	77,143	31,75,877	20·79
1923-24 ..	15,84,488	8,10,645	67,892	38,560	6,88,354	31,89,939	19·88
1924-25 ..	16,89,892	12,25,632	1,19,721	27,862	2,52,556	33,15,663	19·67
1925-26 ..	18,89,417	12,05,078	1,01,876	69,049	2,58,535	35,23,955	20·66
1926-27 ..	25,30,286	5,97,486	1,68,896	5,882	3,94,389	36,96,939	23·76
1927-28 ..	21,99,448	5,59,107	1,49,132	5,042	2,97,270	32,09,999	24·96
1928-29 ..	22,40,393	6,56,713	2,29,540	2,240	2,56,180	33,85,066	25·03
1929-30 ..	22,45,450	7,33,867	1,56,773	3,638	2,34,897	33,74,625	25·26

Year	Expenditure on Establishment in the Irrigation Branch						Total Establishment charges in the Roads and Buildings and Irrigation Branches	Percentage on the total outlay of works and repairs in Roads and Buildings and Irrigation Branches
	55—Construction of Irrigation, Navigation, Embankment and Drainage Works	XIII—Works for which capital accounts are kept	15—Other Revenue Expenditure financed from Ordinary Revenues	Deposit Works	Total establishment charges	Percentage on the total outlay on works and repairs in the Irrigation Branch		
1	9	10	11	12	13	14	15	16
	Rs.	Rs.	Rs.	Rs.	Rs.		Rs.	
1921-22 ..	11,53,734	13,85,960	6,68,651	2,770	32,11,115	33·59	66,47,003	24·26
1922-23 ..	14,20,751	13,44,901	5,34,327	1,993	33,01,972	32·22	64,77,849	25·38
1923-24 ..	21,87,793	14,43,222	4,32,013	2,056	40,65,084	33·89	72,55,023	25·87
1924-25 ..	29,10,785	17,37,724	5,26,361	492	51,75,362	28·73	84,91,025	24·35
1925-26 ..	32,21,647	17,99,343	5,19,228	2,681	55,42,899	21·62	90,66,854	21·23
1926-27 ..	35,56,959	18,08,385	5,94,989	3,207	59,63,540	30·56	96,60,479	27·54
1927-28 ..	36,98,956	19,20,773	7,80,312	3,847	64,03,888	26·00	96,13,887	25·64
1928-29 ..	39,04,670	21,35,939	6,16,601	2,750	66,59,960	25·51	1,00,45,026	25·35
1929-30 ..	42,26,873	21,08,302	6,18,312	1,012	69,54,499	23·26	1,03,29,124	23·88

Note.—The percentage of the establishment charges on the cost of works and repairs in the Irrigation Branch (column 14) is generally higher than that in the Roads and Buildings Branch (column 8). The reason is largely that the establishment charges in the Irrigation Branch include the cost of Special Revenue Establishment employed entirely on "revenue management" work on certain canal systems in Sind and the Deccan which has no connection with the execution of works and repairs, and that these charges also include cost of part of the time of Irrigation establishment spent on revenue management including the *control and distribution of water*, which is debited in the accounts to "revenue management" and not to execution of works and repairs. If these establishment charges debited in the accounts to "revenue management" are deducted from the total cost of establishment in the Irrigation Branch the percentage on the cost of works and repairs will not be so divergent. The percentage in 1929-30 was less mainly on account of the increase in expenditure on works on the Lloyd Barrage and Canals Construction Project and on works and repairs in Sind due to floods.

IRRIGATION ADMINISTRATION REPORT
PART II—SIND—1929-30

DESCRIPTION OF IRRIGATION

1. The Province of Sind is situated beyond the influence of the south-west and the north-east monsoons, and in consequence its rainfall is normally small and unreliable. Unlike the greater part of India, therefore, the area of cultivation in Sind that depends upon rainfall is insignificant. The river Indus, however, brings down abundant supplies of water, the discharge rarely falling below 22,000 cusecs, while the average is as high as 110,000 cusecs. From where it enters the Province of Sind, the river is generally in deltaic formation, flowing along an elevated ridge formed by its own alluvial deposits. The indigenous system of irrigation by inundation canals takes advantage of this physical peculiarity. The device is primitive ; a cut is taken out from the river and after a short distance the canal turns to a course parallel to the river commanding the low-lying lands falling away from the marginal ridge. These old irrigation works have been improved and extended. Scientific methods have been introduced into the design and control of the canals, and many of them have been provided with head regulators. But there are inherent defects in this method of irrigation. The cultivation at present dependent on river inundations is principally kharif, and even this is subject to insecurity of supply due to fluctuation in the river water levels ; the low water supplies in the winter season can be tapped only to a small extent and largely run to waste in the sea. When the Lloyd Barrage and Canals scheme, now under construction, comes into operation perennial irrigation will displace the present precarious inundation supply throughout the large portion of Sind which will be commanded by this scheme.

1. NATURE OF INUNDATION AND RAINFALL

2. Up to the middle of July the river was low but it maintained a satisfactory level during the remainder of the season which adequately met the general requirements of irrigation. Owing to heavy rains in the Punjab and the bursting of the Shyok Glacier in Kashmir, the river rose very high, the highest reading at Attock being 66·5 feet on the 28th August. The flood height at Bukkur was 17·7 feet on the 6th September 1929 against the highest on record, viz. 17·9 feet in 1897. At Kotri a record flood was experienced, the maximum gauge reading being 24·1 feet on the 13th September 1929 against the previous maximum of 23·8 feet in 1914. Timely precautions were taken and no dangerous breaches occurred.

3. The fair irrigating level of 13 feet and over on the Bukkur gauge was obtained for 49 days during the season compared with 11 days in 1928, 21 days in 1927, 44 days in 1926 and 25 days, the average of the last three years. The fair irrigating level of 17 feet on the Kotri gauge was first reached on the 27th July 1929 and was maintained for a period of 58 days

against 85 days in 1928, 47 days in 1927, 68 days in 1926 and 67 days, the average of the last three years.

4. The rainfall during the season was heavy but not of material benefit to the crops as it fell chiefly late in the season when the canals were running full. Torrential rains in Lower Sind and hill torrents in the Upper Sind Frontier District did a considerable amount of damage to the kharif crops in certain places.

5. The following table shows further the comparison of the principal features of the inundation compared with those of the previous years :—

Gauges	Average of ten years including 1928	Average of three years including 1928	1928	1929
	Days	Days	Days	Days
Bukkur 10′ and over	75	71	91	60
Bukkur 13′ and over	29	25	10	49
Kotri 14′ and over	109	108	137	116
Kotri 17′ and over	73	67	85	58

2. INDUS RIGHT BANK CIRCLE

A. GENERAL REVIEW OF THE RESULTS OF THE YEAR 1929-30

Area of cultivation Government, Jagir and Foreign.

6. The gross assessed areas for the year are given in the sub-joined statement A :—

Statement A

Year and class of crops	55-Construction of Irrigation, Navigation, Embankment and Drainage Works not charged to Revenue A-Irrigation Works			15-Other Revenue Expenditure financed from Ordinary Revenues A-Irrigation : Works for which neither capital nor revenue accounts are kept	Grand Total
	Productive	Unproductive	Total		
1	2	3	4	5	6
	Acres	Acres	Acres	Acres	Acres
Average for 3 years ending 1928-29. Kharif	1,150,601	98,878	1,249,479	27,989	1,277,468
Average for 3 years ending 1928-29. Rabi ..	314,613	16,817	331,430	25,808	357,238
Total ..	1,465,214	115,695	1,580,909	53,797	1,634,706
1928-29 .. Kharif .	1,230,009	93,044	1,323,053	28,910	1,351,963
1928-29 .. Rabi ..	312,588	16,893	329,481	22,732	352,213
Total ..	1,542,597	109,937	1,652,534	51,642	1,704,176

Statement A—contd.

Year and class of crops		55-Construction of Irrigation, Navigation, Embankment and Drainage Works not charged to Revenue A-Irrigation Works			15-Other Revenue Expenditure financed from Ordinary Revenues A-Irrigation: Works for which neither capital nor revenue accounts are kept	Grand Total
		Productive	Unproductive	Total		
1		2	3	4	5	6
		Acres	Acres	Acres	Acres	Acres
1929-30 ..	Kharif .	1,298,579	78,287	1,376,866	31,916	1,408,782
	Rabi ..	322,792	24,697	347,489	46,048	393,537
	Total ..	1,621,371	102,984	1,724,355	77,964	1,802,319
Increase or decrease as compared with the average.	Kharif .	147,978	—20,591	127,387	3,927	131,314
	Rabi ..	8,179	7,880	16,059	20,240	36,299
	Total ..	156,157	—12,711	143,446	24,167	167,613
Increase or decrease as compared with the year 1928-29.	Kharif .	68,570	—14,757	53,813	3,006	56,819
	Rabi ..	10,204	7,804	18,008	23,316	41,324
	Total ..	78,774	—6,953	71,821	26,322	98,143

The total cultivation of the year shows an increase of 98,143 and 167,613 acres respectively compared with the figures of the previous year and with the average of the previous three years. The area under kharif shows an increase of 56,819 and 131,314 acres respectively compared with the areas of last year and with the average of the previous triennium. The area under rabi shows an increase of 41,324 and 36,299 acres in both cases.

7. The area under "Dubari" or twice cropped land which is not included in statement A was 330,894 acres.

The "Dubari" figures for the previous year and the average of the previous three years were 374,618 and 344,686 respectively.

8. The net consolidated assessment including Hakabo on foreign and Jagir lands after deducting remissions is given in statement B.

Statement B

Year and class of crops		55-Construction of Irrigation, Navigation, Embankment and Drainage Works not charged to Revenue A-Irrigation Works			15-Other Revenue Expenditure financed from Ordinary Revenues A-Irrigation : Works for which neither capital nor revenue accounts are kept	Grand Total
		Productive	Unproductive	Total		
1		2	3	4	5	6
		Rs.	Rs.	Rs.	Rs.	Rs.
Average of past three years ending 1928-29.	Kharif .	39,04,949	2,59,567	41,64,516	75,345	42,39,861
	Rabi ..	9,96,812	51,388	10,48,200	61,549	11,09,749
	Total ..	49,01,761	3,10,955	52,12,716	1,36,894	53,49,610
1928-29 ..	Kharif .	43,58,694	2,78,589	46,37,283	93,673	47,30,956
	Rabi ..	9,65,539	55,053	10,20,592	59,057	10,79,649
	Total ..	53,24,233	3,33,642	56,57,875	1,52,730	58,10,605
1929-30 ..	Kharif .	41,67,240	2,04,138	43,71,378	73,758	44,45,136
	Rabi ..	10,24,478	74,168	10,98,646	80,758	11,79,404
	Total ..	51,91,718	2,78,306	54,70,024	1,54,516	56,24,540
Increase or decrease as compared with the average.	Kharif .	2,62,291	— 55,429	2,06,862	— 1,587	2,05,275
	Rabi ..	27,666	22,780	50,446	19,209	69,655
	Total ..	2,89,957	— 32,649	2,57,308	17,622	2,74,930
Increase or decrease as compared with the year 1928-29.	Kharif .	— 1,91,454	— 74,451	— 2,65,905	— 19,915	— 2,85,820
	Rabi ..	58,939	19,115	78,054	21,701	99,755
	Total ..	— 1,32,515	— 55,336	— 1,87,851	1,786	— 1,86,065

The net assessed revenue shows a decrease of Rs. 1,86,065 and an increase of Rs. 2,74,930 compared with the figures of last year and the average of the previous three years respectively.

Cultivation on river spill.

9. The area cultivated on "Spill water" during the year was 60,179 acres compared with 31,642 acres last year and 31,069 acres the average of the previous three years.

Assessment rate per acre.

10. The average net consolidated assessment per acre on Government land compared with that of the previous year and the average of the previous three years is given below :—

—	Average of previous three years	1929-30	1928-29
55-Construction of Irrigation, Navigation, Embankment and Drainage works not charged to Revenue—			
1. Productive	3·55	3·39	3·66
2. Unproductive	2·71	2·69	3·01
15-Other Revenue Expenditure financed from ordinary revenues works for which neither capital nor revenue accounts are kept	2·62	2·14	2·83
Average of all works	3·45	3·29	3·59

Actual realisations under all heads and the balances outstanding.

11. The following statement shows the realisations under all heads and the balances outstanding at the end of the year :—

Statement C

Years	Collections				Balance outstanding
	Government land and Hakabo	Miscellaneous	Four per cent. Irrigation share of proceeds for sale of occupancy rights	Total receipts	
1	2	3	4	5	6
	Rs.	Rs.	Rs.	Rs.	Rs.
Average of past three years.	48,27,766	88,324	77,964	49,94,054	1,75,711
1928-29 ..	53,29,738	95,214	78,630	55,03,582	1,57,093
1929-30 ..	49,96,244	71,179	79,485	51,46,908	2,48,574
Increase or decrease as compared with 1928-29.	—3,33,494	—24,035	855	—3,56,674	91,481
Increase or decrease as compared with the average of three years ..	1,68,478	—17,145	1,521	1,52,854	72,863

The balance outstanding at the end of the year shows an increase of Rs. 91,481 compared with last year's figure and Rs. 72,863 compared with the average figure of the past three years.

Remission on Government land.

12. The remissions on Government land granted during the year amounted to Rs. 6,57,822 compared with Rs. 2,78,270 and Rs. 4,08,399 of the previous year and the average of the previous three years respectively.

Remission on Jagir land.

13. The remission on Jagir land granted during the year amounted to Rs. 10. No remissions were granted during the previous three years.

Remission on foreign land.

14. The remission on land in foreign territory (Kalat) amounted to Rs. 16,649 compared with Rs. 1,473 last year and Rs. 7,454 the average of the previous three years.

The following statement gives details of the causes for remissions with a comparison of the previous year's figures :—

Causes of remissions	1928-29	1929-30	Difference
	Rs.	Rs.	Rs.
Deficiency of water	76,087	65,273	— 10,814
Breaches in canals	3,362	2,19,982	2,16,620
Blight or Mahlo	211	5,212	5,001
Wire worms or insects	5,901	10,863	4,962
Floods	1,152	1,75,831	1,74,679
Frost	1,40,180	42,946	— 97,234
Locusts	28,625	1,30,642	1,02,017
Rats	....	180	180
Revised settlement	42	....	— 42
Kalar soil	11,575	11,311	— 264
Other causes	1,716	10,243	8,527
Erosion	113	215	102
Adverse winds	10,759	1,514	— 9,245
Fire	20	269	249
Hill torrents	....	....	....
Total ..	2,79,743	6,74,481	3,94,738

Loss to canals foreign and Jagir lands.

15. The difference between "Hakabo" for water rate assessed on foreign and Jagir cultivation and assessment at full rates on those areas amounted to Rs. 2,94,698 which represents the loss of canal revenue during the year due to the low rates charged to Jagirdars in Sind and Zamindars in Kalat territory.

16. The total charges during the year on account of maintenance and repairs amounted to Rs. 40,02,836 as under :—

	Rs.
Works	29,47,531
Establishment and Tools and Plant charges	7,47,803
Revenue collections	3,07,502
Total ..	40,02,836

Expenditure on establishment charged to works amounted to Rs. 4,67,939 and is included in expenditure on works, while the net expenditure on works (clearance and repairs) was Rs. 24,79,592. Compared with last year and the average of the previous three years, the net expenditure on clearance and repairs shows an increase of Rs. 2,05,602 and Rs. 2,65,220 respectively.

Expenditure on Maintenance and Repairs separately for canals and River Embankments.

17. Of the total charges shown in the preceding paragraph Rs. 29,56,467 were on canals and Rs. 10,46,369 on river embankments.

Outlay on new works.

18. The outlay of the year on new works, including establishment and Tools and Plant charges was Rs. 4,41,262 as shown below :—

Of this Rs. 89,645 comprised charges on account of establishment and Tools and Plant and Rs. 3,51,617 on the actual cost of works.

55-Construction of Irrigation, Navigation, Embankment and Drainage works not charged to Revenue—

		Rs.
Productive	Capital ..	3,090
	Revenue ..	78,185
Unproductive	Capital ..	25,323
	Revenue ..	20,779

15-Other Revenue expenditure financed from ordinary revenues—

Works for which neither capital nor revenue accounts are kept.	3,13,865
Total	4,41,262

Regular Establishment charges.

19. The regular establishment charges in respect to irrigation works amounted to Rs. 7,30,961 compared with Rs. 6,59,674 last year and Rs. 6,87,112 the average of the previous three years.

Financial results.

20. The general financial results of all irrigation works in this Circle are shown in the following Statement D :—

Statement D

Class of works	Gross Revenue	Working expenses	Net Revenue	Simple interest	Net profit 1929-30	Net profit 1928-29	Increase	Decrease
1	2	3	4	5	6	7	8	9
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
55-Construction of Irrigation, Navigation, Embankment and Drainage Works not charged to Revenue— Productive ..	44,74,528	28,63,450	16,11,078	5,09,411	11,01,667	11,55,593	..	53,926
Unproductive ..	1,47,635	2,14,733	−67,098	52,257	−1,19,355	−1,32,279	12,924	..
Total ..	46,22,163	30,78,183	15,43,980	5,61,668	9,82,312	10,23,314	12,924	53,926

Statement D—contd.

Class of works	Gross Revenue	Working expenses	Net Revenue	Simple interest	Net profit 1929-30	Net profit 1928-29	Increase	Decrease
1	2	3	4	5	6	7	8	9.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
15-Other Revenue Expenditure financed from ordinary Revenues Works for which neither capital nor revenue accounts are kept ..	5,21,309	13,60,254	—8,38,945	..	—8,38,945	—6,37,266	..	2,01,679
1929-30 ..	51,43,472	44,38,437	7,05,035	5,61,668	1,43,367	..	..	2,42,681
1928-29 ..	54,98,353	45,43,644	9,54,709	5,68,661	..	3,86,048	..	..
Increase or decrease ..	—3,54,881	—1,05,207	—2,49,674	—6,993	..	..	..	2,42,681

21. The following statement shows the ratio of expenditure per acre of area irrigated under all classes of works excluding the cost of surveys for definite projects :—

Statement E

Total area irrigated by all classes of works	Total working expenses and maintenance of canals	Rate of working expenses per acre of area irrigated (column 2÷1)	Expenditure on agriculture works (excluding cost of surveys for special projects)	Rate of expenditure on agricultural works per acre of area irrigated (column 4÷1)	Total working expenses per acre of area irrigated including expenditure on agricultural works (columns 3+5)
1	2	3	4	5	6
Acres	Rs.	Rs.	Rs.	Rs.	Rs.
1,802,319	30,78,183	1·71	13,60,254	·75	2·46

The total working expenses including those on agricultural works amount to Rs. 2·46 per acre of total area irrigated compared with Rs. 2·65 per acre of area irrigated last year and Rs. 2·58 per acre of the average area irrigated during the past three years.

Length of canals and branches.

22. The mileage of main canals in operation during the year was 1,326 and that of branch canals 2,091 or a total of 3,417 as compared with 3,403 miles last year. The total length of river embankments maintained was 591 miles compared with 566 miles last year. The increase in the length of river embankments this year is due to the construction of the Kasimpur Bund and Right Bank Koraiwah and the Satabani Loop in the Shikarpur

Canals Division and the construction of a new Loop behind the Agani Bund and extension of the abandoned Mitho Phulu Bund in the Ghar Canals Division.

Area of principal crops Government, Foreign and Jagir.

23. The areas of principal crops grown during the year were :—

Statement F

	Crops	Lift	Flow	Total	Average of previous three years	1928-29	Increase or decrease as compared with average	Increase or decrease as compared with 1928-29
		Acres	Acres	Acres	Acres	Acres	Acres	Acres
Kharif	Rice ..	15	839,628	839,643	757,678	805,814	81,965	33,829
	Jowari ..	108,188	275,335	383,523	375,598	408,780	7,925	— 25,257
	Bajri ..	34,318	85,186	119,504	85,279	75,286	34,225	44,218
	Cotton ..	209	1,295	1,504	1,989	2,350	— 485	— 846
	Other crops .	8,437	56,172	64,609	58,953	59,733	5,656	4,876
	Total ..	151,167	1,257,616	1,408,783	1,279,497	1,351,963	129,286	56,820
Rabi	Wheat ..	31,946	206,134	238,080	187,473	196,606	50,607	41,474
	Barley ..	401	6,422	6,823	7,580	4,836	— 757	1,987
	Oil-seeds ..	6,579	171,474	178,053	148,303	170,980	29,750	7,073
	Other crops	2,908	298,566	301,474	356,538	354,409	— 55,064	— 52,935
	Total ..	41,834	682,596	724,430	699,894	726,831	24,536	— 2,401
	Grand Total ..	193,001	1,940,212	2,133,213	1,979,391	2,078,794	153,822	54,419

Compared with last year and the average of the previous three years there was an increase of 56,820 acres and 129,286 acres under kharif and a decrease of 2,401 acres and an increase of 24,536 acres under rabi respectively.

Percentage of Kharif.

24. The percentage proportions of kharif and rabi to the total area irrigated were 66 and 34 compared with 65 and 35 last year. The highest kharif percentage obtained was 94 in the Karachi Canals Division and the lowest 58 in the Western Nara Division while in the Ghar Canals, Shikarpur Canals and Begari Canals Divisions percentages of 65, 64 and 62 resulted. The Ghar Canals, Karachi Canals and Western Nara Divisions produced as usual the largest rice areas with 243,537, 213,364 and 189,668 acres respectively, out of the total rice cultivation for the circle of 839,644 acres. The largest areas under Jowari were obtained in the Begari Canals and Shikarpur Canals Divisions

with 163,477 and 105,977 acres respectively, while the largest area under Bajri was, as usual, in the Begari Canals Division, viz. 86,050 acres.

Of the rabi crops, wheat was largely grown in the Begari Canals, Western Nara, Ghar Canals and Shikarpur Canals Divisions. The largest area under oil-seeds was as usual in the Begari Canals Division.

Of the total area irrigated during the year, 91 per cent. was watered by flow and 9 per cent. by lift cultivation.

25. The duties and deltas obtained on canals in this Circle show the usual fluctuations as detailed for each main canal in the following statement :—

Canal	Year under report		Last year		Remarks
	Duty	Delta	Duty	Delta	
1	2	3	4	5	6
	(i) *Begari Canals Division*				
Desert Canal ..	70	3·9	67	4·1	Supply more economically utilised this year.
Unharwah ..	86	3·6	56	6·0	Do.
Begari ..	103	3·7	65	4·9	Supply more economically utilised this year. By providing gates to karia sluices in portions drawing excess, more supply was sent down to the canal tail.
	(ii) *Shikarpur Canals Division*				
Mahiwah ..	43	5·7	43	5·6	
Canals in Rohri ..	35	5·6	43	4·8	Supply uneconomically utilised this year.
Sind Canal ..	43	5·6	43	5·6	
Rajib Canal ..	58	4·2	54	4·4	
Chitti Canal ..	39	5·8	43	5·3	Low duty and higher delta though a higher percentage of rabi was irrigated this year. Water has been used more economically this year.
Garang Canal ..	30	7·2	70	2·2	More kharif irrigated this year.
	(iii) *Ghar Canals Division*				
Sukkur Canal ..	97	4·6	77	5·4	A higher percentage of rabi cultivation was irrigated this year.
Ghar Canal ..	76	4·2	72	4·3	

Canal	Year under report		Last year		Remarks
	Duty	Delta	Duty	Delta	
1	2	3	4	5	6
		(iv) *Western Nara Division*			
Western Nara including Pritchard.	71	5·3	76	5·3	
Marviwah ..	49	5·6	42	5·4	
Phitta Canal ..	9	40·6	23	9·7	Most of the supply of this canal returns back to river.
Dadu Canals ..	42	5·7	42	5·7	
		(v) *Karachi Canals Division*			
Sattah Canal ..	20	12·7	31	9·2	Water has been used more uneconomically this year.
Pinyari Canal ..	43	7·9	35	8·2	Water used more economically this year.
Kalri Canal ..	30	8·1	22	13·2	
Baghar Canal ..	9	40·6	9	45·0	The low duty and abnormally high delta are due to most of the discharge escaping to the sea.

26. On the productive and unproductive works classed under "55-Construction of Irrigation, Navigation, Embankment and Drainage Works" the incidence of working expenses on assessed revenue and per area irrigated were 60·4 per cent. and 1·79 per acre respectively compared with 64·2 per cent. and 2·04 per acre in the previous year.

27. The total value of crops grown on the irrigated area of 2,133,213 acres as estimated by the Revenue authorities was Rs. 4,74,01,167 which gives an average value of Rs. 22 per acre.

B. DETAILS OF DIFFERENT WORKS OR GROUPS OF WORKS AND A COMPARISON OF THE AGRICULTURAL AND FINANCIAL RESULTS OF THE YEAR 1929-30 WITH THOSE OF THE PREVIOUS YEAR AND THE AVERAGE OF THE LAST TRIENNIUM, ETC.

(*a*) Works for which capital accounts are kept

(1) PRODUCTIVE

Desert Canal

28. The Desert New Head was opened on the 28th May but was soon silted as the result of active erosion of the river at its head which started on the 5th of June. The old Head was accordingly opened on the 18th June to supplement the supply. The conditions at the head of this New Feeder are yet not very favourable and it has accordingly been arranged to tail it into the Desert Dhandh to allow it to develop. The canal is for the present being fed from its old Head which has been cleared for the

purpose. Hill torrents did considerable damage to this canal and the crops raised on it.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—A sum of Rs. 5,208 was spent during the year on a survey in connection with the preparation of a project for improving the canal system and on certain minor works under this head.

Maintenance and repairs.—The canal with its branches was maintained in good order at a cost of Rs. 5,07,202 including works establishment.

Irrigation.—The total area irrigated during the year was 164,417 acres of which 125,533 acres were under kharif and 38,884 acres under rabi compared with 234,227 acres last year and 228,904 acres, the average of the previous three years.

Financial results.—The gross revenue from all sources amounted to Rs. 2,57,282 compared with Rs. 5,07,171 last year and Rs. 5,00,729 the average of the previous three years. Deducting working expenses Rs. 6,56,622 the net revenue during the year was *minus* Rs. 3,99,340.

General remarks.—The remissions granted during the year amounted to Rs. 1,89,204 compared with Rs. 42,223 remitted last year.

The principal crops grown were :—

Rice	.. .. ..	42,309 acres
Jowari	.. .. ..	49,075 ,,
Bajri	.. .. ..	28,846 ,,
Wheat	.. .. ..	12,836 ,,
Oil-seeds	.. .. ..	10,033 ,,

and the value of the whole outturn is estimated at Rs. 49,05,311 or an average of Rs. 30 per acre.

UNHARWAH

29. This canal has its take-off from a bye-river and worked very satisfactorily. It did not cease flowing till Bukkur fell to 2·5′. All the kharif crops on it were fully matured.

Capital.—An expenditure of Rs. 3,357 was incurred on the construction of a cross regulator at mile 9/4 of the Nasirwah.

Extensions and improvements.—A sum of Rs. 3,957 was spent during the year on a survey in connection with the preparation of a project for improving the canal system and on certain minor works under this head.

Maintenance and repairs.—The canal with its branches was maintained in good order at a cost of Rs. 81,994 including works establishment.

Irrigation.—The total area irrigated during the year was 118,022 acres of which 60,704 acres were under kharif and 57,318 acres under rabi compared with 107,076 acres last year and 102,826 acres the average of the previous three years.

Financial results.—The gross revenue from all sources amounted to Rs. 2,35,224 compared with Rs. 2,42,470 last year and Rs. 2,35,850 the average of the previous three years. Deducting working expenses

Rs. 1,22,228 the revenue during the year was Rs. 1,12,996 or 13·96 per cent. on the capital outlay to the end of the year compared with 15·43 per cent. last year and 16·98 per cent. the average of the previous three years. The decrease in gross revenue this year inspite of increased area under cultivation is due to the heavy remissions granted.

General remarks.—The remissions during the year amounted to Rs. 41,249 compared with Rs. 22,077 remitted last year.

The principal crops grown were :—

Jowari	.. ..	.. 19,864 acres
Bajri	.. ..	.. 24,955 ,,
Wheat	.. ..	.. 14,725 ,,
Oil-seeds	.. ..	.. 14,475 ,,

and the value of the whole outturn is estimated at Rs. 20,93,192 or an average of Rs. 18 per acre.

Begari Canal

·30. This canal had an excellent supply throughout the season. The new Feeder worked most satisfactorily. It has not silted anywhere, on the other hand there is a scour in its bed at several places.

The Edan and the Sir Canals, the tail branches of the Begari, were also given an excellent supply this year by the operation of the gates provided last year to karias in miles 31 to 76.

Capital.—No expenditure was incurred under this head during the year but a credit of Rs. 1,115 appeared due to recovery from colonists in connection with the Choi Project.

Extensions and improvements.—A sum of Rs. 6,697 was spent during the year on a survey in connection with the preparation of a project for improving the canal system and on certain minor works under this head.

Maintenance and repairs.—The canal and its branches were maintained in good order at a cost of Rs. 4,26,448 including works establishment.

Irrigation.—The total area irrigated during the year was 396,243 acres of which 238,168 acres were under kharif and 158,075 under rabi compared with 353,681 acres last year and 305,981 acres the average of the previous three years.

Financial results.—The gross revenue of the year amounted to Rs. 9,33,492 compared with Rs. 8,38,339 last year and Rs. 7,47,003 the average of the previous three years. Deducting working expenses Rs. 5,98,668 and the share due to old irrigation of Rs. 24,854 the net revenue due to improvements was Rs. 3,09,970 or 12·37 per cent. on the capital outlay to the end of the year compared with 6·77 per cent. last year and 8·72 per cent. the average of the previous three years.

General remarks.—The remissions granted during the year amounted to Rs. 69,893 against Rs. 50,834 remitted last year.

The principal crops grown were :—

Rice	.. ..	.. 96,059 acres.
Jowari	.. ..	.. 93,755 ,,
Bajri	.. ..	.. 30,225 ,,
Wheat	.. ..	.. 32,210 ,,
Oil-seeds	.. ..	.. 47,222 ,,

The value of the whole outturn is estimated at Rs. 1,01,14,679 or an average of Rs. 26 per acre.

Sukkur Canal

31. The Sukkur Canal has two heads one for kharif called the Rahuja Head and the other for rabi known as the Old Head. The Rahuja Head was given a new feeder this year owing to the unfavourable set of the river at the head of the Dhoro from which it used to get its supply. This new Head worked satisfactorily and gave a much higher level of water than that obtained from the Dhoro.

The up-stream gauge at the Rahuja Head Regulator recorded 20·3′ this year, the maximum level obtained.

This Head ceased to flow on 9th January 1930.

The old Head which takes off the river direct just above the Sukkur Railway Bridge was opened on 29th September. It ceased flowing on the 6th January 1930. It helped the rabi cultivation.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—A sum of Rs. 898 was spent during the year on certain minor works under this head.

Maintenance and repairs.—The canal and its branches were maintained in good order at a cost of Rs. 85,080 including works establishment.

Irrigation.—The total area irrigated during the year was 123,794 acres of which 75,575 acres were under kharif and 48,219 acres under rabi compared with 101,012 acres irrigated last year and 94,091 acres the average of the previous three years.

Financial results.—The gross revenue of the year amounted to Rs. 3,10,472 compared with Rs. 2,62,332 last year and Rs. 2,51,667 the average of the previous three years. Deducting working expenses Rs. 1,22,070 and the share due to old irrigation Rs. 71,444, the net revenue due to improvements was Rs. 1,16,958.

General remarks.—The remissions during the year amounted to Rs. 9,641 compared with Rs. 13,281 remitted last year.

The principal crops grown were :—

Rice	.. ..	.. 40,937 acres.
Jowari	.. ..	.. 27,942 ,,
Wheat	.. ..	.. 18,253 ,,
Oil-seeds	.. ..	.. 12,621 ,,

The value of the whole outturn is estimated at Rs. 21,67,618 or an average of Rs. 18 per acre.

Ghar Canal

32. This canal was opened on the 28th May 1929 and ceased flowing on the 3rd November. It was fed from the Arab Dhoro which worked extremely well during the whole abkalani. As the canal has no Head Regulator several cuts had to be made in the Arab Dhoro and in the left

bank of the canal in miles 2/5 to 9/4 to relieve the pressure and save the country from floods.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—A sum of Rs. 149 was incurred during the year on certain minor works under this head.

Maintenance and repairs.—The canal and its branches were maintained in good order at a cost of Rs. 1,93,905 including works establishment.

Irrigation.—The total area irrigated during the year was 358,814 acres of which 238,770 acres were under kharif and 120,044 acres under rabi compared with 377,170 acres last year and 358,781 acres the average of the past three years.

Financial results.—The gross revenue of the year amounted to Rs. 9,91,789 compared with Rs. 10,41,788 last year and Rs. 9,89,138 the average of the previous three years. Deducting working expenses Rs. 2,95,238 and the share due to old irrigation Rs. 1,16,671 the net revenue due to improvements was Rs. 5,79,880 or 85·49 per cent. on the capital outlay to the end of the year compared with 90·12 per cent. last year and 68·69 per cent. the average of the past three years.

General remarks.—The remissions during the year amounted to Rs. 64,366 compared with Rs. 17,993 remitted last year.

The principal crops grown were :—

Rice	..	..	.. 202,600 acres.
Jowari	..	..	.. 31,065 ,,
Wheat	..	..	.. 36,408 ,,
Oil-seeds	..	..	.. 29,121 ,,

The value of the whole outturn is estimated at Rs. 96,11,128 or Rs. 27 per acre.

Canals in Rohri

33. These canals worked satisfactorily with the usual rotations. The Arorewah had to be closed for some days during the high river for the safety of the Barrage canals under construction.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—A sum of Rs. 6,209 was spent under this head on several minor works during the year.

Maintenance and repairs.—The canals were maintained in good order at a cost of Rs. 1,05,923 including works establishment.

Irrigation.—The total area irrigated during the year was 66,893 acres of which 47,822 acres were under kharif and 19,071 acres under rabi compared with 56,231 acres last year and 55,064 acres the average of the previous three years.

Financial results.—The gross revenue amounted to Rs. 1,61,047 compared with Rs. 1,49,516 last year and Rs. 1,41,215 the average of the previous three years. Deducting working expenses Rs. 1,51,440 the net

revenue due to improvements was Rs. 9,607 or 5·55 per cent. on the capital outlay to the end of the year compared with 17·67 per cent. last year and 16·69 per cent. the average of the past three years.

General remarks.—The remissions during the year amounted to Rs. 15,551 against Rs. 13,066 remitted last year.

The principal crops grown were :—

Rice	.. .. ..	3,424 acres.
Jowari	.. .. ..	35,777 ,,
Bajri	.. .. ..	5,624 ,,
Wheat	.. .. ..	12,098 ,,
Oil-seeds	.. .. ..	4,280 ,,

The value of the whole outturn is estimated at Rs. 10,80,212 or an average of Rs. 16 per acre.

Sind Canal

34. Except at the beginning of July when the river was low this canal had a very good supply this year. The F. S. L. of 13 feet and over was obtained for 49 days against 17 of last year. Groynes constructed last year helped in scouring the bed which increased the supply.

The erosion at the head of Col. Fife's channel which now feeds the Sind Canal system has stopped. The set of the river is now towards the left bank and a good dhoro has been formed on this side.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—A sum of Rs. 16,907 was spent under this head on certain minor works during the year.

Maintenance and repairs.—The canal and its branches were maintained in good order at a cost of Rs. 87,297 including works establishment.

Irrigation.—The total area irrigated during the year was 87,805 acres, of which 57,722 acres were under kharif and 30,083 acres under rabi compared with 80,110 acres irrigated last year and 74,045 acres the average of the previous three years.

Financial results.—The gross revenue amounted to Rs. 2,72,974 compared with Rs. 2,61,225 last year and Rs. 2,38,762 the average of the previous three years. Deducting working expenses Rs. 1,47,124 the net revenue due to improvements was Rs. 1,25,850 or 15·08 per cent. on the capital outlay to the end of the year compared with 16·20 per cent. last year and 15·63 per cent. the average of previous three years.

General remarks.—The remissions granted during the year amounted to Rs. 34,268 compared with Rs. 20,830 last year.

The principal crops grown were :—

Rice	.. .. ..	23,490 acres.
Jowari	.. .. ..	26,163 ,,
Wheat	.. .. ..	9,544 ,,
Oil-seeds	.. .. ..	3,247 ,,

The value of the whole outturn is estimated at Rs. 14,28,467 or an average of Rs. 16 per acre.

Rajib, Chitti and Garang Canals

35. These canals take off the Dhoro which formerly fed the Sukkur Canal. They had a good supply and worked satisfactorily.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—No expenditure was incurred under this head during the year but a credit of Rs. 10 appeared on certain minor works.

Maintenance and repairs.—The canals were maintained in good order at a cost of Rs. 12,932 including works establishment.

Irrigation.—The total area irrigated during the year was 25,158 acres of which 13,314 acres were under kharif and 11,844 acres under rabi compared with 17,515 acres irrigated last year and 19,007 acres the average of the past three years.

Financial results.—The gross revenue amounted to Rs. 89,444 compared with Rs. 60,720 last year and Rs. 66,993 the average of the past triennium.

General remarks.—The remissions granted during the year amounted to Rs. 5,016 against Rs. 8,243 remitted last year.

The principal crops grown were :—

Rice	.. .. ..	3,715 acres.
Jowari	.. .. ..	5,254 ,,
Wheat	.. .. ..	5,368 ,,

The value of the whole outturn is estimated at Rs. 4,89,632 or an average of Rs. 19 per acre.

Baghar Canal

36. With the construction of the Head Regulator the working of this canal system has generally improved and the tract commanded by it has been relieved from floods.

The canal commenced flowing this year on 3rd May and stopped flowing on 3rd November. It worked satisfactorily. The Baghar is an old arm of the river following an extremely tortuous course and needs improvements for which a Project is under preparation.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—Expenditure of Rs. 4,754 was incurred under this head on a survey for the improvement of this system.

Maintenance and repairs.—The canal with its branches was maintained in good order at a cost of Rs. 30,011 including works establishment.

Irrigation.—The total area irrigated during the year was 37,500 acres of which 34,177 acres were under kharif and 3,323 acres under rabi compared with 31,301 acres last year and 39,598 acres the average of the previous three years.

Financial results.—The gross revenue amounted to Rs. 86,052 compared with Rs. 81,974 last year and Rs. 79,001 the average of the past triennium.

Deducting working expenses Rs. 50,312, the net revenue due to improvements was Rs. 35,740 or 4·68 per cent. on the capital outlay to the end of the year, compared with 4·67 last year and 4·32 per cent. the average of the previous three years.

General remarks.—The remissions granted during the year amounted to Rs. 6,465 compared with Rs. 2,812 remitted last year.

The principal crops grown were :—

Rice	.. ..	.. 29,518 acres.
Bajri	.. ..	.. 3,023 ,,
Barley	.. ..	.. 1,131 ,,

The value of the whole outturn is estimated at Rs. 8,27,609 or an average of Rs. 22 per acre.

INDUS CANALS RIGHT BANK

37. *Capital.*—No expenditure was incurred under this head during the year.

Extensions and improvements.—An expenditure of Rs. 2,076 was incurred under this head on a survey for the improvement of this system.

Maintenance and repairs.—The canals were maintained in good order at a cost of Rs. 15,790 including works establishment.

Irrigation.—The total area irrigated during the year was 27,653 acres of which 26,004 acres were under kharif and 1,649 acres under rabi compared with 24,994 acres last year and 29,253 acres the average of the past three years.

Financial results.—The gross revenue amounted to Rs. 52,296 compared with Rs. 59,989 last year and Rs. 52,861 the average of the past three years. Deducting working expenses Rs. 26,520, the net revenue due to improvements was Rs. 25,776 or 28·33 per cent. on the capital outlay to the end of the year compared with 37·80 per cent. last year and 21·71 per cent. the average of the past three years. The decrease in gross revenue this year inspite of the increased area under cultivation is due to the heavy remissions granted.

General remarks.—The remissions granted during the year amounted to Rs. 6,433 compared with Rs. 1,662 remitted last year.

The principal crops grown were :—

Rice	.. ..	.. 24,100 acres.
Bajri	.. ..	.. 1,075 ,,

The value of the whole outturn is estimated at Rs. 5,62,855 or an average of Rs. 20 per acre.

PINYARI CANAL

38. This canal was opened on the 15th May 1929 with Kotri gauge reading 11·7′. It ceased to flow on 2nd November. Due to a change in the course of the river at the head of this canal, a new head was given to it this year about two furlongs above last year's Head. It worked satisfactorily throughout the abkalani. The distribution system on this canal is defective due mainly to an enormous number of karias without

sluices drawing excessive supply. The question of remodelling the canal is under consideration.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—A sum of Rs. 1,919 was spent under this head on a survey for the improvement of the Gungri and branches and on certain minor works during the year.

Maintenance and repairs.—The canal and its branches were maintained in good order at a cost of Rs. 1,13,005 including works establishment.

Irrigation.—The total area irrigated during the year was 97,557 acres of which 90,724 acres were under kharif and 6,833 acres under rabi compared with 102,460 acres last year and 101,378 acres the average of the past three years.

Financial results.—The gross revenue amounted to Rs. 2,51,658 compared with Rs. 3,35,539 last year and Rs. 2,34,338 the average of the last three years. Deducting working expenses Rs. 1,60,969 the net revenue due to improvements was Rs. 90,689 or 7·27 per cent. on the capital outlay to the end of the year compared with 12·17 per cent. last year and 5·89 per cent. the average of the past three years.

General remarks.—The remissions granted during the year amounted to Rs. 27,152 compared with Rs. 27,074 remitted last year.

The principal crops grown were :—

Rice	..	..	.. 87,205 acres.
Bajri	..	..	.. 2,031 ,,
Oil seeds	..	..	.. 4,588 ,,

The value of the whole outturn is estimated at Rs. 18,97,530 or an average of Rs. 19 per acre.

INDUS CANALS LEFT BANK

39. *Capital.*—No expenditure was incurred under this head during the year.

Extensions and improvements.—A sum of Rs. 8,829 was spent under this head on surveys for the improvement of this system and on other minor works.

Maintenance and repairs.—The canals were maintained in good order at a cost of Rs. 51,205 including works establishment.

Irrigation.—The total area irrigated during the year was 39,345 acres of which 38,488 acres were under kharif and 857 acres under rabi compared with 41,967 acres irrigated last year and 42,745 acres the average of the past three years.

Financial results.—The gross revenue amounted to Rs. 94,487 compared with Rs. 1,60,206 last year and Rs. 1,06,681 the average of the past three years. Deducting working expenses Rs. 86,453 the net revenue due to improvements was Rs. 8,034 or 3 per cent. on the capital outlay to the end of the year compared with 28·93 per cent. last year and 15·38 per cent. the average of the past triennium.

General remarks.—The remissions granted during the year amounted to Rs. 16,815 compared with Rs. 9,065 remitted last year.

The principal crops grown were :—

Rice	..	..	.. 36,608 acres.
Bajri	..	..	.. 1,513 ,,

The value of the whole outturn is estimated at Rs. 9,81,460 or an average of Rs. 25 per acre.

Sattah Canal

40. This canal was opened late, i.e., on the 12th June owing to the low river. There was the usual deficiency at the tail due to excessive draw off in the upper reaches which was met by resorting to rotations. A project for remodelling and moduling this canal is under consideration.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—A sum of Rs. 459 was spent under this head on certain minor works during the year.

Maintenance and repairs.—The canal and its branches were maintained in good order at a cost of Rs. 14,998 including works establishment.

Irrigation.—The total area irrigated during the year was 15,724 acres of which 15,630 acres were under kharif and 94 acres under rabi compared with 14,540 acres irrigated last year and 16,408 acres the average of the past three years.

Financial results.—The gross revenue amounted to Rs. 37,052 compared with Rs. 52,137 last year and Rs. 41,543 the average of the past three years. Deducting working expenses Rs. 21,736 and the share due to old irrigation Rs. 6,927 the net revenue due to improvements was Rs. 8,389 or 4·46 per cent. on the capital outlay to the end of the year compared with 6·38 per cent. last year and 6·52 per cent. the average of the past three years.

General remarks.—The remissions granted during the year amounted to Rs. 800 compared with Rs. 933 remitted last year.

The principal crops grown were :—

Rice	..	..	.. 13,544 acres.
Bajri	..	..	.. 1,858 ,,

The value of the whole outturn is estimated at Rs. 3,87,870 or an average of Rs. 25 per acre.

Western Nara including Pritchard

41. The Western Nara Canal flowed with F. S. level of 12·8′ and above for 14 days during the season against 35 days during last year. The river has receded from the head of the canal and it has accordingly now been provided with a new head from the Ford feeder which has been widened for the purpose.

There was deficiency at the tail at the beginning of the abkalani owing to the low river which was partly remedied by resorting to rotations.

Some of the kharif crop was damaged by heavy rains and hill torrents. There has been extensive rabi this year on this canal.

As regards the Pritchard Canal a higher level of water was obtained this year owing to the set of the river being towards its head.

The canal worked satisfactorily and materially assisted the Nara and its branches below the 94th mile.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—A sum of Rs. 3,499 was incurred under this head on certain minor works during the year.

Maintenance and repairs.—The canal with its branches was maintained in good order at a cost of Rs. 2,41,974 including works establishment.

Irrigation.—The total area irrigated during the year was 348,283 acres of which 218,427 acres were under kharif and 129,856 acres under rabi compared with 362,412 acres last year and 335,656 acres the average of the past three years.

Financial results.—The gross revenue amounted to Rs. 9,02,819 compared with Rs. 10,02,124 last year and Rs. 8,97,950 the average of the past three years. Deducting working expenses Rs. 3,62,381 the net revenue due to improvements was Rs. 5,40,438 or 23·53 per cent. on the capital outlay to the end of the year compared with 25·31 per cent. last year and 21·64 per cent. the average of the past three years.

General remarks.—The remissions granted during the year amounted to Rs. 1,31,233 compared with Rs. 34,683 remitted last year.

The principal crops grown were :—

Rice	..173,390 acres.
Jowari	.. 40,672 ,,
Wheat	.. 48,543 ,,
Oil seeds	.. 26,638 ,,

The value of the whole outturn is estimated at Rs. 71,19,906 or an average of Rs. 20 per acre.

Phitta Canal

42. This canal takes off a bye-river near Malkani village and has worked satisfactorily.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—No expenditure was incurred under this head during the year.

Maintenance and repairs.—The canal was maintained in good order at a cost of Rs. 5,650 including works establishment.

Irrigation.—The total area irrigated during the year was 7,726 acres of which 3,592 acres were under kharif and 4,134 acres under rabi, compared with 5,348 acres last year and 5,397 acres the average of the past three years.

Financial results.—The gross revenue amounted to Rs. 16,443 compared with Rs. 12,928 last year and Rs. 13,094 the average of the previous three years. Deducting working expenses Rs. 8,056 the net revenue due to improvements was Rs. 8,387 or 32·09 per cent. on the capital outlay to the end of the year compared with 25·88 per cent. last year and 30·11 per cent. the average of the past triennium.

General remarks.—The remissions granted during the year amounted to Rs. 1,203 compared with Rs. 47 remitted last year.

The principal crops grown were :—

Jowari	..	..	..	3,462 acres.
Wheat	..	..	..	2,098 ,,
Oil seeds	..	..	..	1,037 ,,

The value of the whole outturn is estimated at Rs. 1,05,659 or an average of Rs. 14 per acre.

MARVIWAH

43. A bye-river has formed at the old head of this canal from which the canal was given supply this year. The portion of the canal above the first regulator was cut up by river spills in several places which have since been repaired. Kharif cultivation in low ground was damaged by heavy rains. Rabi cultivation has been very good.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—No expenditure was incurred under this head during the year.

Maintenance and repairs.—The canal and its branches were maintained in good order at a cost of Rs. 6,319 including works establishment.

Irrigation.—The total area irrigated during the year was 7,339 acres of which 4,801 acres were under kharif and 2,538 acres under rabi compared with 6,715 acres the average of the previous three years.

Financial results.—The gross revenue amounted to Rs. 17,943 compared with Rs. 19,766 last year and Rs. 18,053 the average of the previous there years. Deducting working expenses Rs. 8,993 the net revenue due to improvements was Rs. 8,950. The decrease in gross revenue inspite of the increased area under cultivation was due to heavy remissions granted during the year.

General remarks.—The remissions granted during the year amounted to Rs. 2,945 compared with Rs. 339 remitted last year.

The principal crops grown were :—

Rice	..	..	..	3,984 acres.
Jowari	..	..	..	703 ,,
Wheat	..	..	..	554 ,,

The value of the whole outturn is estimated at Rs. 1,09,904 or an average of Rs. 15 per acre.

Dadu Canals

44. *Capital.*—No expenditure was incurred under this head during the year.

Extensions and improvements.—No expenditure was incurred under this head during the year.

Maintenance and repairs.—The canals with their branches were maintained in good order at a cost of Rs. 16,786 including works establishment.

Irrigation.—The total area irrigated during the year was 12,757 acres of which 9,129 acres were under kharif and 3,628 acres under rabi against 12,403 acres irrigated last year and 11,353 acres the average of the past three years.

Financial results.—The gross revenue amounted to Rs. 34,130 compared with Rs. 30,291 last year and Rs. 29,226 the average of the previous three years. Deducting working expenses Rs. 23,111 the net revenue due to improvements was Rs. 11,019 or 38·11 per cent. on the capital outlay to the end of the year compared with 39·05 per cent. last year and 28·99 per cent. the average of the previous three years.

General remarks.—The remissions granted during the year amounted to Rs. 371 compared with Rs. 665 remitted last year.

The principal crops grown were :—

Rice	..	..	..	5,618 acres.
Jowari	..	..	..	3,385 ,,
Wheat	..	..	..	625 ,,

The value of the whole outturn is estimated at Rs. 1,94,245 or an average of Rs. 15 per acre.

(2) UNPRODUCTIVE

Mahiwah

45. The Gudu Dhandh which feeds the Mahiwah continues to have a favourable head.

The Mahiwah worked very satisfactorily and flowed for 188 days this year against 145 days in the previous year. It ceased flowing on 5th December 1929 when Bukkur fell to 0·5 foot.

The Kander Branch was remodelled and moduled this year with very good results. The cultivation on it has increased and the complaints of deficiency have ceased.

Capital.—An expenditure of Rs. 20,244 was incurred during the year on remodelling the Kander Branch.

Extensions and improvements.—A sum of Rs. 259 was spent during the year under this head for apparatus required for measuring the discharge of the canal.

Maintenance and repairs.—The canal with its branches was maintained in good order at a cost of Rs. 1,10,347 including works establishment.

Irrigation.—The total area irrigated during the year was 95,375 acres of which 62,227 acres were under kharif and 33,148 acres under rabi compared with 78,283 acres last year and 73,016 acres the average of the past three years.

Financial results.—The gross revenue amounted to Rs. 2,12,506 compared with Rs. 1,89,493 last year and Rs. 1,69,056 the average of the previous three years. Deducting working expenses Rs. 1,53,572 and the share due to old irrigation Rs. 89,217, the net revenue was *minus* Rs. 30,283.

General remarks.—The remissions granted during the year amounted to Rs. 18,598 compared with Rs. 7,790 remitted last year.

The principal crops grown were :—

Rice	..	..	9,847 acres.
Jowari	..	..	36,994 ,,
Bajri	..	..	9,926 ,,
Wheat	..	..	18,057 ,,
Oil seeds	..	..	5,823 ,,

The value of the whole outturn is estimated at Rs. 12,61,375 or an average of Rs. 13 per acre.

Kalri Canal

46. The Kalri Canal worked satisfactorily. The work of remodelling the canal is in progress.

Capital.—No expenditure was incurred under this head during the year.

Extensions and improvements.—A sum of Rs. 16,353 was spent on the construction of a sub-divisional office with out-houses and store room at Tatta and on additions and alterations to the Darogha's landhi at Kalri Bridge.

Maintenance and repairs.—The canal and its branches were maintained in good order at a cost of Rs. 30,025 including works establishment.

Irrigation.—The total area irrigated during the year was 17,088 acres of which 16,060 acres were under kharif and 1,028 acres under rabi compared with 16,361 acres last year and 18,381 acres the average of the past three years.

Financial results.—The gross revenue amounted to Rs. 45,626 compared with Rs. 50,528 last year and Rs. 36,994 the average of the past three years. Deducting working expenses Rs. 61,161 the net revenue due to improvements was *minus* Rs. 15,535.

The decrease in gross revenue this year inspite of the increased area under cultivation is due to the heavy remissions granted.

General remarks.—The remissions granted during the year amounted to Rs. 5,343 compared with Rs. 1,114 remitted last year.

The principal crops grown were :—

Rice	..	..	..	13,141 acres.
Bajri	..	..	..	1,881 „

The value of the whole outturn is estimated at Rs. 3,24,820 or an average of Rs. 19 per acre.

(b) Works for which capital accounts are not kept

Canals and River Bunds

47. The following canals which were formerly classed under "15, Works for which only revenue accounts are kept" have been reclassified under the head "15, Works for which neither capital nor revenue accounts are kept" :—

(1) New feeder to Western Nara.
(2) Aral.
(3) Manchur.
(4) Wahurwah.
(5) Canals north of Kotri.

Bunds in the Begari Canals Division

48. There was heavy pressure against the Tori and Haibat Loops which were raised from 6 to 18 inches. The banks of the Begari Feeders were cut to relieve pressure on the Gouspur Loop. Open gaps in the bank of the new Khirtar Branch of the Barrage Canals under construction were quickly filled in and the bank was kept ready to serve as a second line of defence in case the Kashmor Bund breached.

Bunds in the Shikarpur Canals Division

49. The Sukkur Begari Bund gave trouble in miles 2, 4, 32 and 33 where it leaked badly. One sluice in mile 3/6 was in danger of collapsing and was therefore closed. On the left bank the flood diversion bund and the new extended Kasimpur Bund successfully checked the floods from entering the Eastern Nara.

Bunds in the Ghar Canals Division

50. There was much pressure against the Saidabad Jhalli Bund, the flood level being 1 to 1·5 feet higher than the record level of 1924. The bund is accordingly being raised in weak portions and sand trenched where constructed of bad kalar.

Bunds in the Karachi Canals Division

51. The bund lines on the left and right banks were very strongly guarded and their weak portions were strengthened and raised where necessary.

A loop bund behind mile 1/3 to 3/1 of the Baghar Uchito Bund has been found necessary owing to river erosion at this site and is under construction.

52. *Extensions and improvements.*—A sum of Rs. 2,50,968 was spent under this head mainly on the following works :—

	Rs.
(1) Constructing the proposed extension of Kasimpur Bund mile 5/2 to 17/0 of Koraiwah ..	1,42,418
(2) Raising and strengthening Koraiwah Right Bank from mile 17/0 to 11/6	54,445
(3) Constructing wetting bunds for feeding wetting channels on the Beechanjee and Garang Loops and constructing Regulator at Head ..	3,663
(4) Raising and strengthening Nara bunds mile 39/5 to 67/2 in the Pritchard Subdivision	3,285
(5) Constructing a wetting channel on the Nara bunds from mile 42/0 to 58/7 in the Pritchard Subdivision	5,746
(6) Constructing a new sluice in mile 34/3 of the Sukkur Begari Bund to replace a dangerous one.	4,042
(7) Constructing a bund from Taki 70 of the New Cut Begari to mile 0/2 of the 1896 Loop with side slopes 3 to 1 on both sides	15,000
(8) Surveying the Indus River	8,534

Maintenance and repairs.—All bunds in this Circle were maintained in good order at a cost of Rs. 8,10,640 including works establishment. Of this Rs. 1,03,949 were spent in the Begari Canals Division, Rs. 2,81,025 in the Shikarpur Canals Division, Rs. 66,372 in the Ghar Canals Division, Rs. 1,71,015 in the Western Nara Division and Rs. 1,88,279 in the Karachi Canals Division.

Irrigation and financial results.—The areas irrigated by canals ex-Kashmor Bund and on bunds in the Shikarpur Canals, Ghar Canals, Western Nara and Karachi Canals Divisions were 6,925, 11,513, 165, 55,566 and 11,551 acres respectively while the revenue therefrom amounted to Rs. 14,809, 28,745, 871, 72,759 and 23,552.

General remarks.—The remissions granted during the year amounted to Rs. 27,935 compared with Rs. 5,012 remitted last year.

Expenditure on and receipts from gardens.—The expenditure on and receipts from gardens during the year are compared below with the figures of the previous three years—

Year	Expenditure on the maintenance of gardens	Receipts
	Rs.	Rs.
1926-27	7,533	1,492
1927-28	8,506	1,192
1928-29	8,745	1,240
1929-30	7,057	524

PLANTATIONS

53. The total number of trees planted during the year was 25,157 of which 3,783 were talli, 15,068 babul and the rest were principally nim. The total number of trees alive at the end of the year was 422,107.

3. INDUS LEFT BANK CIRCLE

A. GENERAL REVIEW OF THE RESULTS OF THE YEAR 1929-30

54. The gross assessed areas for the year are given in the subjoined statement A.

Area of cultivation, Government and Jagir.

Statement A

Year and class of crops	55, Construction of Irrigation, Navigation, Embankment and Drainage Works not charged to Revenue. A—Irrigation Works			15. Other Revenue Expenditure financed from Ordinary Revenues A-Irrigation Works. Works for which neither Capital nor Revenue Accounts are kept	Grand total
	Productive	Unproductive	Total		
1	2	3	4	5	6
	Acres	Acres	Acres	Acres	Acres
Average for three years ending 1928-29 .. Kharif.	662,768	594,639	1,257,407	11,433	1,268,840
Rabi..	126,425	68,602	195,027	1,905	196,932
Total ..	789,193	663,241	1,452,434	13,338	1,465,772

Year and class of crops	55, Construction of Irrigation, Navigation, Embankment and Drainage Works not charged to Revenue. A—Irrigation Works			15, Other Revenue Expenditure financed from Ordinary Revenues A-Irrigation Works. Works for which neither Capital nor Revenue Accounts are kept	Grand total
	Productive	Unproductive	Total		
1	2	3	4	5	6
	Acres	Acres	Acres	Acres	Acres
1928-29 .. Kharif.	655,721	593,948	1,249,669	12,498	1,262,167
1928-29 .. Rabi..	136,315	67,360	203,675	1,187	204,862
Total ..	792,036	661,308	1,453,344	13,685	1,467,029
1929-30 .. Kharif.	696,732	650,038	1,346,770	15,076	1,361,846
1929-30 .. Rabi..	95,081	94,365	189,446	8,548	197,994
Total ..	791,813	744,403	1,536,216	23,624	1,559,840
Increase or decrease as compared with the average. Kharif.	33,964	55,399	89,363	3,643	93,006
Increase or decrease as compared with the average. Rabi..	— 31,344	25,763	— 5,581	6,643	1,062
Total ..	2,620	81,162	83,782	10,286	94,068
Increase or decrease as compared with 1928-29. Kharif.	41,011	56,090	97,101	2,578	99,679
Increase or decrease as compared with 1928-29. Rabi..	— 41,234	27,005	— 14,229	7,361	— 6,868
Total ..	— 223	83,095	82,872	9,939	92,811

The total cultivation shows an increase of 94,068 acres and 92,811 acres when compared with the figures of the average of the last three years and with those of the last year, respectively. The areas under Kharif and Rabi show an increase of 99,679 acres and a decrease of 6,868 acres, respectively as compared with the figures of last year and increase of 93,006 acres and 1,062 acres, respectively, when compared with those of the last triennium.

55. The area of " dubari " (twice cropped land) which is not included in statement (A) was 111,985 acres of which 22,681 acres were watered dubari in the Thar Parkar District. Thar dubari figures for the previous

year and the average figures for the previous three years were 34,941 acres and 35,794 acres while those of watered dubari were 4,438 acres and 13,277 acres respectively.

Irrigation Assessment, Government and Jagir.

56. The net irrigation assessment for the year including "Hakabo" for Jagir lands is given in statement B.

Statement B

Year and class of crops		55, Construction of Irrigation, Navigation, Embankment and Drainage Works not charged to Revenue. A—Irrigation Works			15, Other Revenue Expenditure financed from Ordinary Revenues A-Irrigation Works. Works for which neither Capital nor Revenue Accounts are kept	Grand total
		Productive	Unproductive	Total		
1		2	3	4	5	6
		Rs.	Rs.	Rs.	Rs.	Rs.
Average of three years ending 1928-29 ..	Kharif.	17,3 ,460	17,03,142	34,35,602	29,603	34,65,205
	Rabi..	2,43,054	1,83,926	4,26,980	5,835	4,32,815
	Total ..	19,75,514	18,87,068	38,62,582	35,438	38,98,020
1928-29 ..	Kharif.	18,41,365	18,39,181	36,80,546	33,421	37,13,967
	Rabi..	2,40,859	2,06,707	4,47,566	2,840	4,50,406
	Total ..	20,82,224	20,45,888	41,28,112	36,261	41,64,373
1929-30 ..	Kharif	13,70,279	10,42,596	24,12,875	25,497	24,38,372
	Rabi..	2,19,793	3,64,705	5,84,498	28,902	6,13,400
	Total ..	15,90,072	14,07,301	29,97,373	54,399	30,51,772
Increase or decrease as compared with the average.	Kharif.	— 3,62,181	— 6,60,546	— 10,22,727	— 4,106	—10,26,833
	Rabi..	— 23,261	1,80,779	1,57,518	23,067	1,80,585
	Total ..	— 3,85,442	— 4,79,767	— 8,65,209	18,961	— 8,46,248
Increase or decrease as compared with the year 1928-29.	Kharif.	— 4,71,086	— 7,96,585	— 12,67,671	— 7,924	—12,75,595
	Rabi..	— 21,066	1,57,998	1,36,932	26,062	1,62,994
	Total ..	— 4,92,152	— 6,38,587	— 11,30,739	18,138	—11,12,601

The net assessed Revenue shows a decrease of Rs. 11,12,601 and Rs. 8,46,248 as compared with that of the previous year and the average of the previous three years, respectively.

Cultivation on river spill.

57. The area cultivated on spill water was 13,396 acres, as compared with 2,933 acres of the previous year and 2,450 acres of the previous three years.

Assessment rates per acre on Government land.

The average net consolidated rate per acre on Government land for the year under report and the previous year and the average of the previous three years are shown below :—

	Average of previous three years	1929-30	1928-29
55-Construction of Irrigation, Navigation, Embankment and Drainage Works not charged to Revenue	Rs.	Rs.	Rs.
1. Productive	2·72	2·21	2·89
2. Unproductive	2·90	1·94	3·16
15-Other Revenue expenditure financed from Ordinary Revenues			
Works for which neither capital nor revenue accounts are kept	2·71	2·32	2·70
Average for all works	2·80	2·07	3·01

Actual realizations under all heads and the balance outstanding.

58. The following statement C shows the realizations under all heads and the balance outstanding at the end of the year :—

Statement C

Years	Collections				Balance outstanding
	Government land and Hakabo	Miscellaneous	Four per cent. irrigation share of proceeds from sale of occupancy rights	Total receipts	
1	2	3	4	5	6
	Rs.	Rs.	Rs.	Rs.	Rs.
Average of past three years ..	35,02,862	1,34,285	1,56,235	37,93,382	1,95,608
1928-29	38,00,627	1,38,054	1,56,958	40,95,639	1,50,846
1929-30	24,30,915	1,08,221	1,66,154	27,05,290	5,12,896
Increase or decrease as compared with 1928-29 ..	— 13,69,712	— 29,833	9,196	— 13,90,349	3,62,050
Increase or decrease as compared with average of three years ..	— 10,71,947	— 26,064	9,919	— 10,88,092	3,17,288

The balance outstanding at the end of the year shows an increase of Rs. 3,62,050 as compared with that of the previous year and of Rs. 3,17,288 as compared with the average of the previous three years. The total outstanding balance at the end of the year on the Jamrao canal under both Government and Jagir was Rs. 2,27,776 against Rs. 32,516 at the end of the last year and Rs. 36,497 the average of the previous triennium.

Remission on Government land.

59. The remissions granted during the year on Government land amounted to Rs. 15,54,621 against Rs: 1,51,895 remitted last year and Rs. 3,58,730, the average amount for the previous three years.

The following statement gives details of the causes of remissions and compares the results of the year under report with those of the previous year :—

Causes of remissions	1928-29	1929-30	Difference
1	2	3	4
	Rs.	Rs.	Rs.
Deficiency of water and draught	38,963	16,858	— 22,105
Breaches of canals	686	3,17,320	3,16,634
Floods and erosion	....	6,84,345	6,84,345
Kalar soil	5,422	591	— 4,831
Grants cancelled and arrears	....	....	....
Locusts	838	1,84,870	1,84,032
Blights of Mahlo	2,375	21	— 2,354
Insects or wire worms	10,296	3,986	— 6,310
Written off	....	149	149
Frost	78,060	3,41,241	2,63,181
Rats	8,717	139	— 8,578
Other causes	6,538	5,101	— 1,437
Total ..	1,51,895	15,54,621	14,02,726

Remissions on Jagir lands.

60. The remissions on Jagir lands amounted to Rs. 13,057. The remissions were granted by the Commissioner in Sind as a special case owing to losses caused by the heavy rains and attacks of locusts which caused damage to standing crops. Out of the above sum, Rs. 12,812 were remitted in the Hyderabad Collectorate, and the balance Rs. 245 in the Nawabshah Collectorate.

Loss to canals by Jagir lands.

61. The difference between Hakabo or water rate assessed on the Jagir cultivation and the assessment at full rates on these areas is Rs. 2,81,386.

Expenditure on maintenance and repairs and establishment charged to Revenue.

62. The total charges during the year on account of maintenance and repairs amounted to Rs. 26,10,170 as shown below :—

	Rs.
Works	15,77,392
Establishment and Tools and Plant	8,77,830
Percentage charges for Revenue collection ..	1,54,948
Total ..	26,10,170

The establishment charged to works amounted to Rs. 3,33,007 and is included in the expenditure for " Works " while the net expenditure on " Works " (Clearance and repairs) was Rs. 12,44,385. As compared with the previous year and the average of the previous three years the net expenditure on clearance and repairs shows an increase of Rs. 3,16,073 and Rs. 2,52,363 respectively, and the charges on account of establishment and tools and plant show an increase of Rs. 28,491 and Rs. 1,15,065, respectively.

Expenditure on maintenance and repairs separately for canals and river embankments.

63. Of the total charges shown in the preceding paragraph the amount spent on canals including the cost of surveys for special canal projects is Rs. 23,12,281 and on the river embankments Rs. 2,53,035 and on the Indus River Gauging Division Rs. 44,854.

Outlay on New Works.

64. The outlay for the year on new works including establishment and tools and plant and pensionary charges was :—

55-Construction of Irrigation, Navigation, Embankment and Drainage Works not charged to Revenue

		Rs.
Productive ..	Capital	4,20,331
	Revenue	8,680
Unproductive ..	Capital	2,72,267
	Revenue	36,270

15-Other Revenue expenditure financed from ordinary Revenues

Works for which neither capital nor revenue accounts are kept

Revenue	2,36,941
Total ..	9,74,489

Under " 55—Productive Capital " the works expenditure was Rs. 4,20,331 incurred on several works in the Fuleli Canals Division.

Under "55—Unproductive Capital " the works expenditure amounted to Rs. 2,72,321 on Improvements to Nara supply channel but after deducting Rs. 54 on account of recoveries from Colonists the net expenditure was Rs. 2,72,267.

Regular establishment charges.

65. The regular establishment charges in respect of irrigation works amounted to Rs. 9,24,040 which is Rs. 72,035 more than the figure for the previous year and Rs. 97,411 more than the average of the previous three years.

Financial Results.

66. The General Financial Results of all the irrigation works in this Circle are shown in the following statement.

Statement D

Class of works	Gross Revenue	Working expenses	Net Revenue	Simple interest	Net profit 1929-30	Net profit 1928-29	Increase	Decrease
1	2	3	4	5	6	7	8	9
	Rs	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
55-Construction of Irrigation, Navigation, Embankment and Drainage works not charged to Revenue.								
1. Productive ..	14,46,962	8,17,695	6,29,267	1,84,555	4,44,712	9,49,225	..	5,04,513
2. Unproductive ..	12,01,797	15,11,006	— 3,09,209	8,23,285	— 11,32,494	— 1,57,819	..	9,74,675
Total ..	26,48,759	23,28,701	3,20,058	10,07,840	— 6,87,782	7,91,406	..	14,79,188
15-Other Revenue expenditure financed from ordinary revenues works for which neither capital nor revenue accounts are kept.								
Miscellaneous.	51,751	5,75,337	— 5,23,586	..	— 5,23,586	— 4,32,493	..	91,093
1929-30 ..	27,00,510	29,04,038	— 2,03,528	10,07,840	— 12,11,368	3,58,913	..	15,70,281
1928-29 ..	40,91,308	27,45,247	13,46,061	9,87,148	3,58,913	— 5,64,921	9,23,834	..
Increase or decrease.	— 13,90,798	1,58,791	— 15,49,589	20,692	— 15,70,281	9,23,834	9,23,834	15,70,281

67. The following statement shows the rate of expenditure per acre of area irrigated under all classes of works including (agricultural works) "works for which neither capital nor revenue accounts are kept" and after excluding the cost of the surveys for definite projects.

Statement E

Total area irrigated by all classes of works	Total working expenses and maintenance of canals	Rate of working expenses per acre of area irrigated (Column 2 divided by column 1)	Expenditure on agriculture works for which neither capital nor revenue accounts are kept (excluding the cost of surveys for special projects)	Rate of expenditure on agriculture works for which neither capital nor revenue accounts are kept, per acre of area irrigated (Column 4 divided by column 1)	Total working expenses per acre of area irrigated including expenditure on works for which neither capital nor revenue accounts are kept (Column 3 *plus* 5)
1	2	3	4	5	6
Acres.	Rs.	Rs.	Rs.	Rs.	Rs.
1,559,840	23,28,701	1·49	5,75,337	0·37	1·86

The total working expenses including expenditure on works for which neither capital nor revenue accounts are kept was Rs. 1·86 per acre of the total area irrigated, as compared with Rs. 1·87 per acre in the previous year and Rs. 1·90 the average rate during the past three years.

Length of canals and Bunds.

68. There were 1,285 miles of main canals and 3,166 miles of the branch canals total 4,451 miles in operation during the year against the previous year's total mileage of 4,466 miles (main canals 1,312 miles and branch canals 3,154 miles).

The total length of river embankments is 421 miles. The last year's figure was 415 miles.

Areas of principal crops Government and Jagir.

69. The areas of principal crops grown during the year were :—

Statement F

Crops		1929-30 Lift	1929-30 Flow	1929-30 Total	Average of previous three years	1928-29	Increase or decrease as compared with previous three years	Increase or decrease as compared with 928-29
1		2	3	4	5	6	7	8
		Acres	Acres	Acres	Acres	Acres	Acres	Acres
Kharif ..	Rice ..	65	361,524	361,589	336,856	343,391	24,733	18,198
	Jowari ..	92,889	63,066	155,955	130,785	140,214	25,170	15,741
	Bajri ..	338,229	132,566	470,795	422,770	339,092	48,025	131,703
	Cotton ..	147,753	169,827	317,580	323,705	386,148	— 6,125	— 68,568
	Other crops.	18,909	37,033	55,942	54,723	53,322	1,219	2,620
	Total ..	597,845	764,016	1,361,861	1,268,839	1,262,167	93,022	99,694
Rabi ..	Wheat ..	28,097	132,070	160,167	100,419	107,981	59,748	52,186
	Barley ..	139	2,778	2,917	3,759	3,620	— 842	— 703
	Oil Seeds ..	1,748	80,472	82,220	57,253	58,677	24,967	23,543
	Other crops.	2,304	62,356	64,660	70,593	69,525	— 5,933	— 4,865
	Total ..	32,288	277,676	309,964	232,024	239,803	77,940	70,161
Grand Total ..		630,1331	,041,692	1,671,825	1,500,863	1;501,970	170,962	169,855

As compared with the last year and the average of the previous triennium there is an increase of 99,694 acres and 93,022 acres, respectively, under Kharif and 70,161 acres and 77,940 acres, respectively under Rabi.

There is an increase of 18,198 acres and 24,733 acres in the areas of rice under Kharif and a decrease of 68,568 acres and 6,125 acres in the areas of cotton, as compared with last year and the previous three years, respectively. With the exception of rice and cotton under Kharif and wheat

under Rabi there is an increase of 168,039 acres and 92,606 acres in the areas of all the crops under Kharif and Rabi as compared with those of last year and with the average of last three years respectively.

Percentages of Kharif and Rabi.

70. The percentages of Kharif and Rabi areas irrigated in the Circle were 81 and 19 against 84 and 16 of the last year. The highest Kharif percentage was 86 in the Fuleli Canals Division and the lowest in the Jamrao Canals Division, while the Eastern Nara, Hyderabad Canals and Nasrat Canals Divisions had 82, 78 and 82 per cent. respectively.

The Fuleli and Eastern Nara Divisions had, as usual, the largest rice areas, viz. 282,340 acres and 41,777 acres, respectively out of the total rice cultivation of 361,589 acres for this Circle.

The largest areas under Bajri were in the Hyderabad and Fuleli Canals Divisions, viz. 157,851, acres and 88,854 acres respectively, the Jamrao, Eastern Nara and Nasrat Canals Divisions recording 68,247 acres, 83,987 acres and 71,856 acres, respectively.

The largest area under Jowari was as usual, in the Nasrat Canals Division, viz. 131,325 acres. The total area under cotton in the Circle was 317,580 acres, that on the Jamrao Canal and Eastern Nara, being 104,442 acres and 76,009 acres, respectively.

The largest area of wheat was in the Jamrao Canals Division and amounted to 45,384 acres out of the total of 160,167 acres for the whole Circle, Fuleli Canals Division recording 31,367 acres, Nasrat 23,978 acres and Eastern Nara 37,078 acres, respectively. The smallest area of wheat was in the Hyderabad Canals Division, viz. 22,360 acres.

The largest area under oil seeds was in the Nasrat Canals Division, viz. 32,113 acres out of the total for the Circle of 82,220 acres, the Eastern Nara Division recording the lowest, viz. 6,062 acres.

Out of the total area cultivated during the year 37 per cent. was watered by lift and 63 per cent. by flow against 38 and 62 per cent., respectively, during the last year.

71. The duties and deltas of canals in this Circle show the usual fluctuations in values as shown in the subjoined statement.

Statement showing the duties and deltas of canals

Name of Canal	Year under report		Last year		Remarks
	Duty	Delta	Duty	Delta	
1	2	3	4	5	6
NASRAT CANALS DIVISION					
Dad Canal including Ren Distributary.	63	8·2	53	8·8	Rise in duty and fall in delta due to increased cultivation.
Nasrat Canal	86	2·8	53	4·6	Do.

Name of Canal	Year under report		Last year		Remarks
	Duty	Delta	Duty	Delta	
1	2	3	4	5	6
NASRAT CANALS DIVISION—*contd.*					
Naulakhi Canal	40	5·8	38	6·4	
Dambhro Canal	68	3·0	65	3·1	
Mehrabwah	45	5·0	51	4·8	The fall in duty and rise in delta due to the canal being supplemented by floods.
HYDERABAD CANALS DIVISION					
Ali Bahar Kacheri ..	221	1·6	65	3·8	The rise in duty and fall in delta due to increased cultivation.
Great Marakh	154	2·0	62	5·6	Do. do.
Sarfrazwah	40	5·9	52	4·9	The fall in duty and rise in delta due to abundant supply entering the canal.
Gharo Muhammudo ..	93	2·5	140	1·7	
Kari Shumali	55	5·6	49	6·7	The rise in duty and fall in delta due to increased cultivation.
Nasirwah	49	4·7	54	4·9	
FULELI CANALS DIVISION					
Fuleli Canal—					
Kharif	62	4·9	44	8·3	The rise in duty and fall in delta due to increased cultivation.
Rabi	57	5·9	70	5·0	Fall in duty and rise in delta due to less cultivation.
Hassanali Canal	63	4·9	43	6·8	The rise in duty and fall in delta due to less supply entering the canal.
JAMRAO CANALS DIVISION					
Jamrao Canal—					
Kharif	120	3·0	89	4·7	The rise in duty and fall in delta due to economical use of water.
Rabi ..	92	3·3	72	4·0	
EASTERN NARA DIVISION					
Mithrao Canal—					
Kharif	110	3·0	65	5·2	The rise in duty and fall in delta due to economical use of water.
Rabi	73	1·7	63	5·3	Do.
Hiral Canal	126	2·6	91	3·4	Do.
Thar Canal	65	5·1	57	5·4	
Khipro Canal	67	4·4	97	2·6	The rise in delta and consequent fall in duty due to good supply for a prolonged period.

72. On "Productive Works" the incidence of working expenses on assessed revenue and per acre irrigated were 52·55, per cent. and Rs. 1·01 per acre, respectively, as compared with 41·53 per cent. and Rs. 1·03 per acre in the previous year, that on "Unproductive Works" being 102·91 per cent. and Rs. 2·84 per acre.

Incidence of Working expenses.

73. The total value of crops grown in the irrigated area of 1,671,825 acres, as estimated by the Revenue authorities is Rs. 3,31,94,860 which gives an average rate of Rs. 20 per acre.

Value of each kind of Crop irrigated.

B. DETAILS OF DIFFERENT WORKS OR GROUPS OF WORKS AND A COMPARISON OF THE AGRICULTURAL AND FINANCIAL RESULTS OF THE YEAR 1929-30 WITH THOSE OF THE PREVIOUS YEAR AND THE AVERAGE OF THE LAST TRIENNIUM, ETC.

(a) Works for which capital accounts are kept

(1) PRODUCTIVE

ALIBAHAR KACHERI

74. The canal worked very satisfactorily and for 172 days it was in flow.

Capital. No expenditure was incurred on any works charged to Capital.

Extensions and Improvements. No expenditure was incurred during the year under report.

Maintenance and Repairs. The canal and its branches were maintained in good order at a cost of Rs. 10,001 including the work charged Establishment.

Irrigation. The area irrigated during the year was 18,752 acres (Kharif 12,872 acres and Rabi 5,880 acres) against 12,090 acres (Kharif 11,672 acres and Rabi 418 acres) irrigated in the previous year and 12,907 acres (Kharif 12,310 acres and Rabi 597 acres) the average of the previous three years.

Financial Results. The gross Revenue amounted to Rs. 28,383 against Rs. 28,942 in the last year and Rs. 30,018 the average of previous three years. Deducting working expenses Rs. 15,901 and the share due to old irrigation Rs. 8,239 the net revenue due to improvements was Rs. 4,243 or 3·96 per cent. on the capital outlay to end of the year against 1·45 per cent. in the last year and 4·92 per cent. the average of the previous three years.

General Remarks. The sum remitted during the year was Rs. 8,387 against Rs. 74 remitted last year and Rs. 399 the average remission of the previous three years.

The principal crops grown were :—

Bajri	..	..	..	9,247	acres
Cotton	..	..	..	2,317	,,
Wheat	..	..	..	2,308	,,
Oil Seeds	..	..	..	3,276	,,

and the value of the whole outturn is estimated at Rs. 2,91,055 or Rs. 16 per acre.

GREAT MARAKH SYSTEM

75. The canal worked very satisfactorily and for 154 days it was in flow.

Capital. No expenditure was incurred on any capital works during the year under report.

Extensions and Improvements. No expenditure was incurred during the year under report.

Maintenance and Repairs. The canal and its branches were maintained in good order at a cost of Rs. 52,522 including work charged establishment.

Irrigation. The area irrigated during the year was 99,130 acres (Kharif 75,256 acres and Rabi 23,874 acres) against 78,125 acres (Kharif 70,616 acres and Rabi 7,509 acres) irrigated in the previous year and 78,986 acres (Kharif 71,955 acres and Rabi 7,031 acres), the average of the previous three years.

Financial Results. The gross revenue amounted to Rs. 1,09,475 against Rs. 1,95,535 in the last year and Rs. 1,97,228, the average of previous three years. Deducting working expenses, viz. Rs. 80,090 and share due to old irrigation, viz. Rs. 36,032, the net revenue due to improvements was *minus* Rs. 6,647.

General Remarks. The remissions granted during the year amounted to Rs. 1,15,254 against Rs. 630 for the last year and Rs. 2,234, the average of the previous three years.

The principal crops grown were :—

Rice	..	..	..	7,839 acres
Bajri	..	..	..	40,217 ,,
Cotton	..	..	..	24,076 ,,
Wheat	..	..	..	7,098 ,,
Oil Seeds	..	..	..	10,191 ,,
Other crops	..	..	..	6,585 ,,

and the value of the whole outturn is estimated at Rs. 14,12,110 or Rs. 14 per acre.

SARFRAZ SYSTEM

76. The canal worked very satisfactorily and for 119 days it was in flow.

Capital. No expenditure was incurred during the year under report.

Extensions and Improvements. No expenditure was incurred during the year under report.

Maintenance and Repairs. The canal and its branches were maintained in good order at a cost of Rs. 21,491 including work charged establishment.

Irrigation. The area irrigated during the year was 27,894 acres (Kharif 24,748 acres and Rabi 3,146 acres) against 23,686 acres (Kharif 22,118 acres and Rabi 1,568 acres) irrigated in the last year and 26,154 acres (Kharif 23,621 acres and Rabi 2,533 acres), the average of the previous three years.

Financial Results. The gross revenue amounted to Rs. 43,327 against Rs. 52,017 in the last year and Rs. 55,126, the average revenue of the previous three years. Deducting working expenses, viz. Rs. 32,472 and share due to old irrigation, viz. Rs. 10,985, the net revenue due to improvements was *minus* Rs. 130.

General Remarks. The sum remitted during the year was Rs. 11,315 against Rs. 158 remitted last year and Rs. 491, the average of the previous three years.

The principal crops grown were :—

Bajri	..	17,618 acres
Cotton	..	5,993 „

and the value of the whole outturn was Rs. 5,63,865 or Rs. 20 per acre.

Gharo Mahmudo System

77. The canal worked very satisfactorily and for 117 days it was in flow.

Capital. No expenditure was incurred on this head during the year under report.

Extensions and Improvements. No expenditure was incurred during the year under report.

Maintenance and Repairs. The canal and its branches were maintained at a cost of Rs. 74,838 including the work charged establishment.

Irrigation. The area irrigated during the year was 93,976 acres (Kharif 72,867 acres and Rabi 21,109 acres) against 77,375 acres (Kharif 65,581 acres and Rabi 11,794 acres) irrigated in the last year.

Financial Results. The gross revenue amounted to Rs. 1,30,100 against Rs. 1,58,113 in the last year. Deducting working expenses Rs. 1,09,469, the net revenue comes to Rs. 20,631 or 18·79 per cent. on the capital outlay to the end of the year as compared with 73·86 per cent. in the previous year and 76·74 per cent., the average of the previous three years.

General Remarks. The sum remitted during the year was Rs. 41,836 against Rs 326 for the last year and Rs. 1,402, the average for the previous three years.

The principal crops grown were :—

Bajri	..	44,494 acres
Cotton	..	24,158 ,,
Wheat	..	6,364 ,,
Oil Seeds	..	6,512 ,,
Other crops	..	8,224 ,,

and the value of the whole outturn was Rs. 14,77,479 or Rs. 16 per acre.

KARI SHUMALI

78. The canal worked very satisfactorily and for 154 days it was in flow.

Capital. No expenditure was incurred on any works charged to ' Capital '.

Extensions and Improvements. No expenditure was incurred on this head during the year under report.

Maintenance and Repairs. The canal and its branches were maintained in good order at a cost of Rs. 30,620 including work charged establishment.

Irrigation. The area irrigated during the year was 44,604 acres (Kharif 37,082 acres and Rabi 7,522 acres) against 37,299 acres (Kharif 34,425 acres and Rabi 2,874 acres) of last year.

Financial Results. The gross revenue amounted to Rs. 59,844 against Rs. 76,039 in the last year. Deducting working expenses Rs. 45,071 the net revenue comes to Rs. 14,773 or 93·54 per cent. on the capital outlay to end of the year as compared with 257·49 per cent. in the previous year and 255·41 per cent., the average of the previous three years.

General Remarks. The sum remitted during the year was Rs. 23,024 against Rs. 242 for the last year and Rs. 545, the average of the previous three years.

The principal crops grown were :—

Bajri	..	25,981 acres
Cotton	..	9,903 ,,
Oil Seeds	..	3,146 ,,

and the value of the whole outturn was Rs. 12,85,311 or Rs. 29 per acre.

NASIRWAH SYSTEM

79. The canal worked very satisfactorily and for 116 days it was in flow.

Capital. No expenditure was incurred on any work charged to ' Capital '.

Extensions and Improvements. No expenditure was incurred on this head during the year under report.

Maintenance and Repairs. The canal and its branches were maintained in good order at a cost of Rs. 21,424 including the work-charged establishment.

Irrigation. The area irrigated during the year was 36,246 acres (Kharif 28,971 acres and Rabi 7,275 acres) against 28,257 acres (Kharif 25,174 acres and Rabi 3,083 acres) irrigated during the last year.

Financial Results. The gross revenue amounted to Rs. 64,164 against Rs. 66,105 in the last year. Deducting working expenses Rs. 32,881 the net revenue comes to Rs. 31,283 or 66·34 per cent. on the capital outlay to the end of the year, as compared with 66·46 per cent. in the previous year and 67·91 per cent. the average of the previous three years.

General Remarks. The sum remitted during the year was Rs. 14,398 against Rs. 521 for the last year and Rs. 448 the average of the previous three years.

The principal crops grown were:—

Bajri	..	..	19,462 acres
Cotton	..	..	8,576 ,,

and the value of the whole outturn was Rs. 8,90,739 or Rs. 25 per acre as estimated by the Revenue Authorities.

Fuleli Canal System

Inundation. 80. The new Fuleli takes off from the river near Jamshora village, 5½ miles from Hyderabad. The canal is an old tributary of the Indus and is 81 miles in length. It has 3 regulators one at the head, and 2nd at mile 46 at Alipur and the 3rd at the tail. The head of the New Fuleli is very favourable and flows with 2 feet gauge reading at Kotri and gets a very fair perennial supply. The canal worked satisfactorily in the beginning of the season but subsequently due to the heavy rains and high level of the river, the banks at the tails of Imamwah Janubi and Mulchand were overtopped by floods. They have since been thoroughly repaired. The maximum discharges were 11,250 cusecs and 5,825 cusecs respectively.

The old Fuleli which takes off from the river about 8 miles to the north of the new Fuleli was opened on 2nd June and continued to flow up to 13th October 1929. It worked fairly well in the beginning but after heavy rains and floods it gave much trouble. A few breaches occurred in some of the branch canals but were immediately closed.

The canal was in flow for 152 days for Kharif and 168 days for Rabi.

Capital. A capital expenditure of Rs. 3,10,807 was incurred during the year on improvements to the system.

Extensions and Improvements. A sum of Rs. 4,657 was spent on this head during the year.

Maintenance and Repairs. The canal and its branches were maintained in good order at a cost of Rs. 2,10,255 inclusive of work-charged establishment.

Irrigation. The area irrigated during the year was 417,487 acres (Kharif 356,072 acres and Rabi 61,415 acres) as compared with 458,833 acres (Kharif 343,788 acres and Rabi 115,045 acres) irrigated in the previous year and 442,091 acres (Kharif 340,784 acres and Rabi 101,307 acres), the average of previous triennium.

Financial Results. The gross revenue amounted to Rs. 7,99,146 against Rs. 11,45,314 in the previous year and Rs. 10,00,432 the average of the previous three years. Deducting Rs. 3,59,757 for working expenses and Rs. 1,28,188 for the share due to old irrigation, the net revenue due to improvements was Rs. 3,11,201 or 8·49 per cent. on the capital outlay to the end of the year as compared with 18·42 per cent. in the last year and 14·94 per cent. the average of the previous three years.

General Remarks. The remission granted during the year amounted to Rs. 2,80,470 against Rs. 80,282 remitted last year and Rs. 1,66,085 the average of the previous three years.

The principal crops grown were :—

Rice	..	..	249,213 acres
Bajri	..	..	75,368 ,,
Cotton	..	..	21,016 ,,
Wheat	..	..	30,532 ,,
Oil Seeds	..	..	8,222 ,,
Other crops	..	..	20,690 ,,

and the estimated value of the whole outturn was Rs. 85,64,172 or Rs. 21 per acre.

Other Canals in Fuleli Canals Division

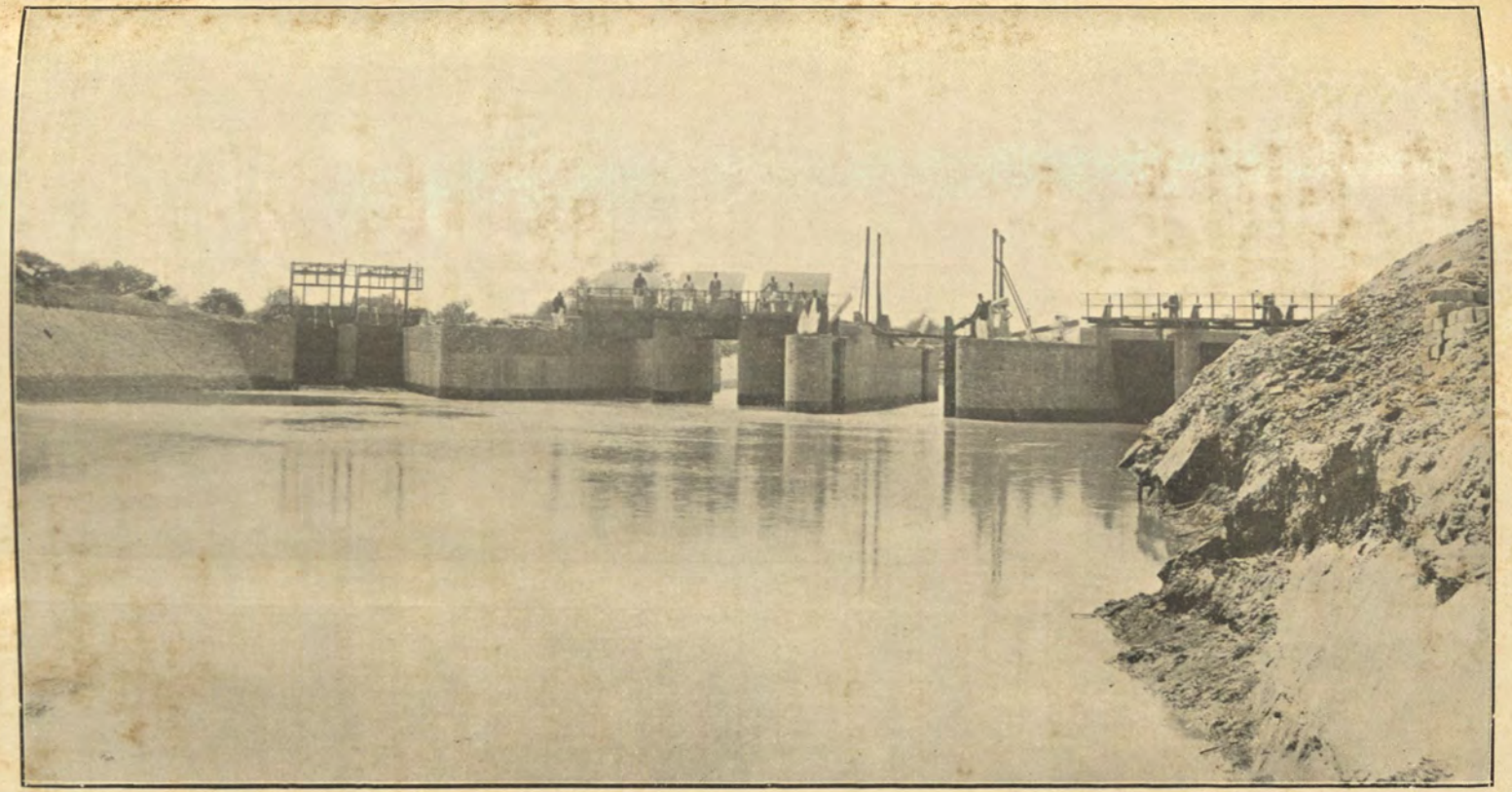
81. The canals in the Hyderabad and Guni Katiar Sub-Divisions worked well during the year.

Capital. No expenditure was incurred under this head.

Extensions and Improvements. An expenditure of Rs. 1,352 was incurred under this head.

Maintenance and Repairs. The canals and branches were maintained in good order at a cost of Rs. 33, 725 including work-charged establishment.

Irrigation. The area irrigated during the year was 31,842 acres (Kharif 28,405 acres and Rabi 3,437 acres) against 27,165 acres (Kharif 22,927 acres and Rabi 4,238 acres) irrigated during the last year.



G. P. Z. P. 1931.

FULELI CANAL

Group Regulators at Mile 71.

Financial Results. The gross revenue amounted to Rs. 58,383 and deducting working expenses Rs. 51,183 the net revenue due to improvements was Rs. 7,200 or 6·21 per cent. on the capital outlay to the end of the year.

General Remarks. The remissions granted during the year amounted to Rs. 18,631 against Rs. 3,205 in the last year and Rs. 11,447, the average of the previous three years.

The principal crops grown were :—

Rice	..	..	16,645 acres
Bajri	..	..	9,438 ,,

and the estimated value of the whole outturn was Rs. 7,03,795 or Rs. 22 per acre.

Naulakhi Canal System

82. The canal was opened on 28th May and ceased flowing on 12th December 1929. It worked satisfactorily till the middle of July when the rains set in and the canal began to give trouble as it has no regulator on it. However by giving a sufficient number of cuts on the right side from mile 20 upwards, the surplus water was successfully disposed of into the river without damage to any large village situated on the canal.

Capital. No expenditure was incurred on this head during the year under report.

Extensions and Improvements. No expenditure was incurred during the year under report, on this head.

Maintenance and Repairs. The canal was maintained in good order at a total cost of Rs. 41,963 including work-charged establishment.

Irrigation. The area irrigated during the year was 62,306 acres (Kharif 47,052 acres and Rabi 15,254 acres) against 51,797 acres (Kharif 45,680 acres and Rabi 6,117 acres) in the previous year.

Financial Results. The gross revenue amounted to Rs. 1,19,121 against Rs. 1,53,115 of the last year. Deducting working expenses Rs. 64,246 the net revenue was Rs. 54,875 or 40·44 per cent. on the capital outlay to end of the year as compared with 41·42 per cent. in the last year and 49·39 per cent. the average of the previous three years.

General Remarks. The remissions granted during the year amounted to Rs. 65,887 against Rs. 710 remitted last year and Rs. 4,105 the average of previous three years.

The principal crops grown were :—

Rice	..	..	8,675 acres
Jowari	..	..	29,246 ,,
Wheat	..	..	7,615 ,,
Oil Seeds	..	..	6,529 ,,

and the estimated value of the whole outturn was Rs. 10,14,650 or Rs. 16 per acre.

DAMBHRO CANAL SYSTEM

83. The canal was opened on 7th June and ceased flowing on 19th September. It was given a new approach channel during the year as the old head was being scoured by the river. The new head worked quite well. The canal had full supply level for 50 days.

Capital. No capital expenditure was incurred during the year under report.

Extensions and Improvements. An expenditure of Rs. 245 was incurred during the year under report.

Maintenance and Repairs. The canal was maintained in good order at a total cost of Rs. 19,899 including work-charged establishment.

Irrigation. The area irrigated during the year was 16,108 acres (Kharif 13,422 acres and Rabi 2,686 acres) against 15,304 acres (Kharif 13,740 acres and Rabi 1,564 acres) in the previous year.

Financial Results. The gross revenue amounted to Rs. 35,019 against Rs. 43,066 of the last year. Deducting working expenses Rs. 29,506 the net revenue comes to Rs. 5,513 or 10·64 per cent. on the capital outlay to the end of the year, as compared with 44·79 per cent. during the previous year and 52·54 per cent. the average of the previous three years.

General Remarks. The remissions granted during the year amounted to Rs. 10,712 against Rs. 259 in the last year and Rs. 884 the average of the previous three years.

The principal crops grown were :—

Jowari	..	..	9,857 acres
Bajri	..	..	2,314 ,,

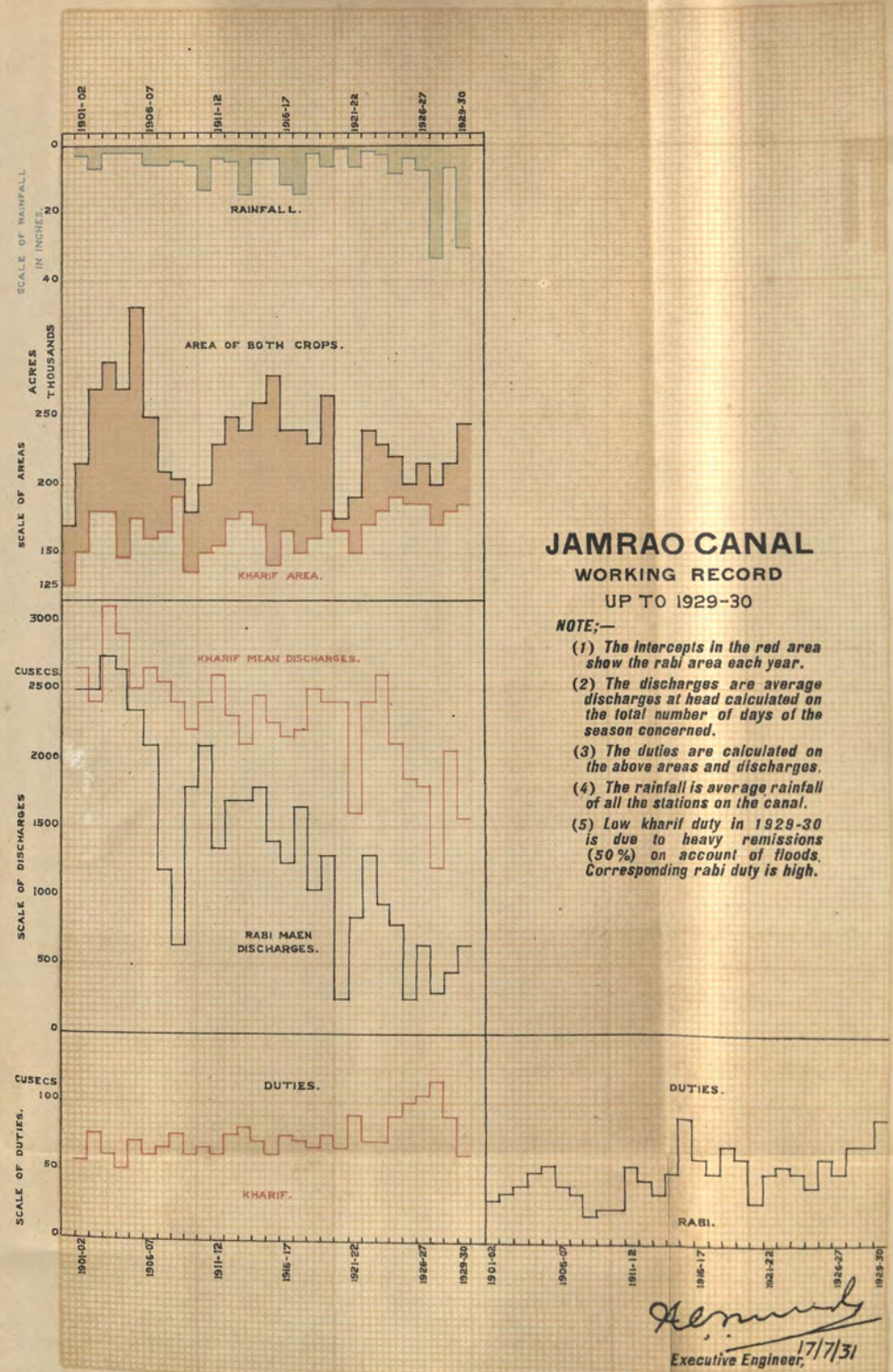
and the estimated value of the whole outturn was Rs. 2,34,510 or Rs. 14 per acre.

(2) UNPRODUCTIVE

JAMRAO CANAL

84. The Jamrao canal and branches were maintained in good order. The canal head was tightly closed from 18th to 25th October for the purpose of scouring the approach channel. The maximum and minimum discharges above the Nara weir were 10,133 cusecs on 25th August and 743 on 8th December 1929 respectively. The rainfall during the year was much in excess of the average.

Capital. Expenditure to the extent of Rs. 98,045 was incurred during the year mainly on Improvements to the Nara Supply Channel.



JAMRAO CANAL

WORKING RECORD

UP TO 1929-30

NOTE;—

(1) The intercepts in the red area show the rabi area each year.

(2) The discharges are average discharges at head calculated on the total number of days of the season concerned.

(3) The duties are calculated on the above areas and discharges.

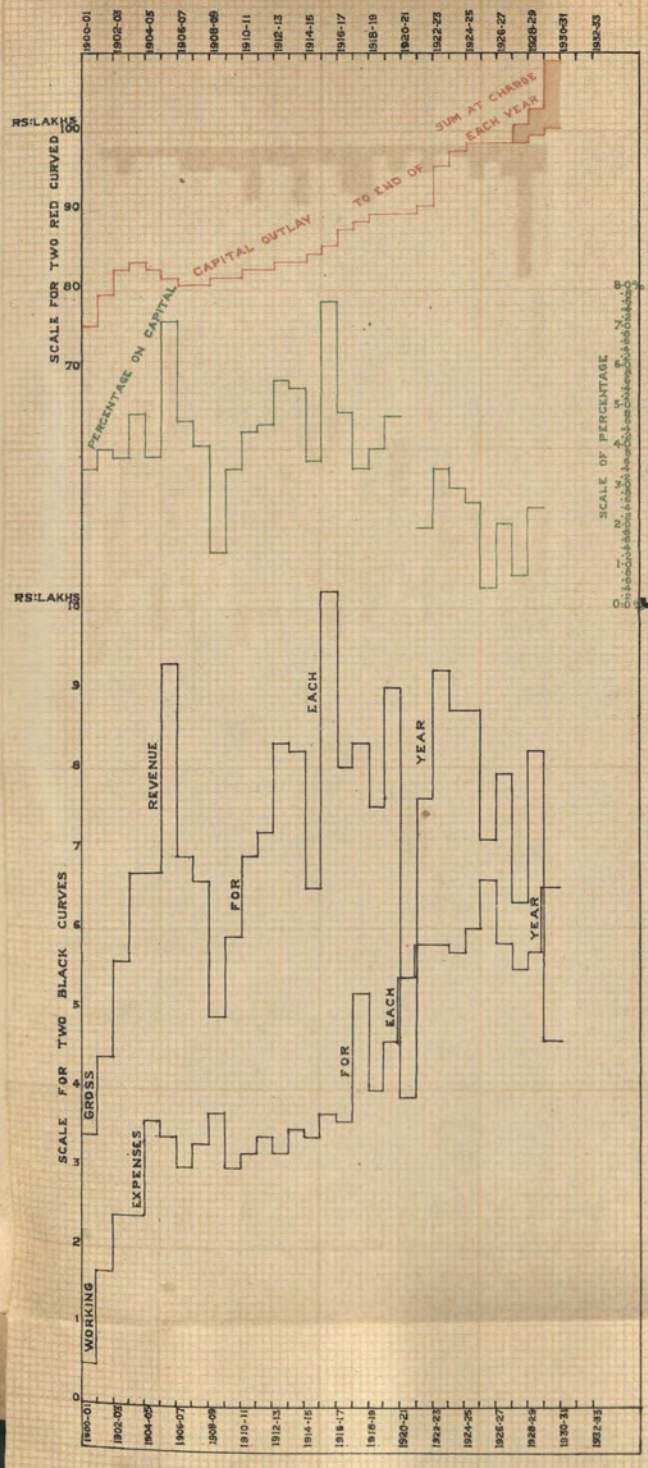
(4) The rainfall is average rainfall of all the stations on the canal.

(5) Low kharif duty in 1929-30 is due to heavy remissions (50%) on account of floods. Corresponding rabi duty is high.

17/7/31

Executive Engineer,
Northern Jamrao Canal Division.

G.P.Z.O. Poona, 1931.



JAMRAO CANAL

FINANCIAL RECORD

UP TO 1929-30.

N.B.—

(1) The intercepts in the red area show arrears of interest unpaid upto end of each year, which being added to the capital give sum-at-charge.

(2) In 1920-21 and 1929-30, working expenses exceeded the gross revenue.

(3) Construction commenced in Nov. 1894

(4) Canal was opened on 24th Nov. 1899.

22/7/31

Executive Engineer,
Northern Jamrao Canal Division.

G.P.Z.O. Poona, 1931.

Extensions and Improvements. A sum of Rs. 16,528 was spent during the year mainly on—

1. Raising and Strengthening Left Bank of West Branch.

2. Raising banks (Inspection path) of main canal and branches Mile 36 to 76/2.

Maintenance and Repairs. The canal and its minors were maintained in good order throughout the year at a cost of Rs. 3,14,222 including work-charged establishment.

Irrigation. The total area irrigated during the year was 244,778 acres (Kharif 186,463 acres and Rabi 58,315 acres) as compared with 214,174 acres (Kharif 181,587 acres and Rabi 32,587 acres) in the last year and 208,873 acres (Kharif 179,304 acres and Rabi 29,569 acres) the average cultivation of the previous three years.

Financial Results. The gross revenue of the year amounted to Rs. 4,55,286 as compared with Rs. 8,17,111 for the last year and Rs. 7,44,952 the average of the previous three years. Deducting working expenses Rs. 6,50,860 the net revenue during the year was a *minus* figure.

General Remarks. The remissions granted during the year amounted to Rs. 3,42,649 against Rs. 21,126 in the last year and Rs. 66,963 the average of the previous three years and was mainly due to floods, frost and locusts.

The principal crops grown were :—

Bajri	..	..	.. 68,247 acres
Cotton	..	..	.. 104,442 ,,
Wheat	..	..	.. 45,384 ,,

and the value of the whole outturn is estimated by the Revenue authorities at Rs. 63,21,023 or Rs. 26 per acre.

Eastern Nara System

85. The season under report commenced with an early rise in the river followed by a comparatively early fall. As compared to the last year the season was more satisfactory in that the river level was steadier.

Capital. An expenditure of Rs. 1,10,926 was incurred on Improvements to the Nara Supply Channel.

Extensions and Improvements. A sum of Rs. 2,515 was spent during the year.

Maintenance and Repairs. All the canals were maintained in good order at a cost of Rs. 2,13,513 including work-charged establishment.

Irrigation. The area irrigated during the year was 255,364 acres (Kharif 209,068 acres and Rabi 46,296 acres) as compared with 207, 787 acres (Kharif 186,641 acres and Rabi 21,146 acres) in the last year and 221,967 acres (Kharif 195,693 acres and Rabi 26,274 acres) the average of the previous triennium.

Financial Results. The gross revenue amounted to Rs. 2,45,094 as compared with Rs. 5,44,646 for the last year and Rs. 5,03,598 the average of the previous triennium. Deducting Rs. 3,73,350 for working expenses and Rs. 3,100 for the share due to old irrigation, the net revenue due to improvements during the year was *minus* Rs. 1,31,356.

General Remarks. The remissions granted during the year amounted to Rs. 3,11,129 against Rs. 20,511 for the last year and Rs. 44,606 the average figure for the previous three years.

The principal crops grown were :—

Rice	..	..	41,777 acres
Bajri	..	..	83,987 ,,
Cotton	..	..	76,009 ,,
Wheat	..	..	37,078 ,,

and the value of the whole outturn is estimated at Rs. 59,24,253 or Rs. 23 per acre.

Dad Canal System

86. The canal was opened on 22nd May and ceased flowing on 7th November. It worked very satisfactorily. The supply being low in the beginning, rotations were restored to for some time on the intermediate regulators but subsequently there was too much water in every reach owing to rains and floods inspite of complete closure of all regulators.

Extensions and Improvements. An expenditure of Rs. 108 was incurred on this head during the year.

Maintenance and Repairs. The canal and its branches (including Ren Distributary) were maintained in good order at a total cost of Rs. 1,40,615 including work-charged establishment.

Irrigation. The total area irrigated during the year was 1,41,723 acres (Kharif 115,379 acres and Rabi 26,344 acres) as compared with 121,338 acres (Kharif 104,709 acres and Rabi 16,629 acres) in the last year and 125,749 acres (Kharif 106,844 acres and Rabi 18,905 acres) the average of the previous three years.

Financial Results. The gross revenue of the year amounted to Rs. 2,34,279 as compared with Rs. 3,29,684 for the previous year and Rs. 3,22,569 the average of the three previous years. Deducting the working expenses Rs. 2,55,523 and the share due to old irrigation Rs. 38,699 the net revenue due to improvements was *minus* Rs. 59,943.

General Remarks. The remissions granted during the year amounted to Rs. 1,25,108 against Rs. 5,703 remitted in the last year and Rs. 21,450 the average of the previous three years.

The principal crops grown were :—

Rice	.. .. ..	17,834 acres
Jowari	.. .. ..	35,568 ,,
Bajri	.. .. ..	43,448 ,,
Cotton	.. .. ..	10,390 ,,
Oil Seeds	.. .. ..	10,976 ,,

and the estimated value of the whole outturn was Rs. 19,75,615 or Rs. 14 per acre.

Nasrat Canal System

87. The Lundi Head to the Nasrat canal worked very well though the Dhand feeding it has been silting. It was flowing up to 0'1' at Bukkur on 21st December 1929 although it was heavily damaged by the Khairpur spill water.

The Nasrat canal was opened on the 10th May and ceased flowing on 21st December. Notwithstanding the low river in the beginning of the season, the canal brought in a very good supply of water.

Capital. No expenditure was incurred on this head during the year under report.

Extensions and Improvements. No expenditure was incurred during the year under report on this head.

Maintenance and Repairs. The canal and its branches were maintained in good order at a cost of Rs. 1,04,327 including work-charged establishment.

Irrigation. The total area irrigated during the year was 133,313 acres (Kharif 117,608 acres and Rabi 15,705 acres) as compared with 110,331 acres (Kharif 98,995 acres and Rabi 11,336 acres) in the last year and 101,305 acres (Kharif 93,190 acres and Rabi 8,115 acres) the average cultivation of the previous three years.

Financial Results. The gross revenue of the year amounted to Rs. 2,26,433 as compared with Rs. 3,13,228 for the previous year and Rs. 2,79,436 the average of the previous three years. Deducting working expenses Rs. 1,90,868 and the share due to old irrigation Rs. 53,046 the net revenue during the year was *minus* Rs. 17,481.

General Remarks. The remissions granted during the year amounted to Rs. 1,63,875 against Rs. 13,629 remitted last year and Rs. 25,646 the average of the previous three years.

The principal crops grown were :—

Jowari	.. .. ..	47,591 acres
Bajri	.. .. ..	17,801 ,,
Cotton	.. .. ..	27,209 ,,
Other crops	.. ..	23,477 ,,
Oil Seeds	.. .. ..	9,341 ,,

and the estimated value of the whole outturn was Rs. 15,81,420 or Rs. 12 per acre.

HASSANALI CANAL SYSTEM

88. The Hassanali canal takes off from the Indus near Katiar and has a favourable head. It flowed with F.S.L. practically throughout the season. The branches near the tail however suffered from deficiency which was due to unrestricted withdrawals from the upper reach. All the other branches of the canal worked satisfactorily.

Capital. No expenditure was incurred under this head during the year under report.

Extensions and Improvements. No expenditure was incurred during the year under report on this head.

Maintenance and Repairs. The canal and its branches were maintained in good order at a cost of Rs. 23,528 including work-charged establishment.

Irrigation. The area irrigated during the year was 22,362 acres (Kharif 21,520 acres and Rabi 842 acres) as compared with 24,512 acres (Kharif 22,016 acres and Rabi 2,496 acres) irrigated last year and 21,962 acres (Kharif 19,607 acres and Rabi 2,355 acres) the average of the previous three years.

Financial Results. The gross revenue amounted to Rs. 40,705 as compared with Rs. 59,231 for the previous year and Rs. 49,107 the average of the previous three years. Deducting Rs. 42,418 for working expenses and Rs. 2,458 for the share due to old irrigation, the net revenue due to improvements was *minus* Rs. 4,171.

General Remarks. The remissions of the year amounted to Rs. 20,575 against Rs. 3,467 remitted last year and Rs. 11,077 the average of the previous three years.

The principal crops grown were :—

Rice	.. .. ..	16,482 acres
Bajri	.. .. ..	4,048 ,,

and the estimated value of the whole outturn was Rs. 4,87,003 or Rs. 22 per acre.

(b) Works for which capital accounts are not kept

CANALS

NASRAT CANALS DIVISION

89. The principal canals under this classification are Mehrab and other canals.

Extensions and Improvements. No expenditure was incurred on this head during the year under report.

Maintenance and Repairs. All the canals under this head were maintained in good order at a cost of Rs. 35,021 inclusive of work-charged establishment.

Irrigation. The total area irrigated on these canals during the year was 22,133 acres (Kharif 13,776 acres and Rabi 8,357 acres) as compared with 12,922 acres (Kharif 11,666 acres and Rabi 1,256 acres) irrigated during the previous year.

Financial Results. The total canal revenue amounted to Rs. 43,764 and the maintenance and revenue collection charges were Rs. 1,07,479 which represents 245·59 per cent. on the Revenue and Rs. 5·23 per acre irrigated.

General Remarks. The remissions granted during the year amounted to Rs. 12,435 against Rs. 1,046 remitted last year and Rs. 906 the average remission in the previous triennium.

The principal crops grown were :—

Jowari	..	..	9,063 acres
Bajri	..	..	4,132 ,,
Wheat	..	..	3,610 ,,
Oil Seeds	..	..	4,623 ,,

and the estimated value of the whole outturn was Rs. 3,79,210 or Rs. 17 per acre.

Hyderabad Canals Division

90. The principal canals under this head are old Ren and two or three very small canals.

Extensions and Improvements. No expenditure was incurred on this head during the year under report.

Maintenance and Repairs. All the canals were maintained in good order at a cost of Rs. 5,486 inclusive of work-charged establishment.

Irrigation. The total area irrigated was 3,807 acres (Kharif 1,300 acres and Rabi 2,507 acres) as compared with 975 acres (Kharif 832 acres and Rabi 143 acres) irrigated during the last year.

Financial Results. The total canal revenue amounted to Rs. 6,625 and maintenance and revenue collection charges were Rs. 5,486 or 21·49 per cent. on the revenue and Rs. 1·78 per acre irrigated.

General Remarks. The remissions granted during the year amounted to Rs. 1,993 against Rs. 6 remitted in the previous year.

The principal crops grown were :—

Bajri	..	..	832 acres
Wheat	..	..	1,285 ,,
Oil seeds	..	..	1,147 ,,

and the estimated value of the whole outturn was Rs. 88,650 or Rs. 23 per acre.

Bunds

91. All the bunds in this Circle stood the water pressure well and only a small breach occurred in the newly constructed portion of the Ren Bund in the Hyderabad Canals Division, but caused no damage.

92. A sum of Rs. 1,55,015 was spent on this head. Of this a sum of Rs. 410 was spent in Hyderabad Canals Division, Rs. 1,51,077 in the Nasrat Canals Division and Rs. 3,528 in the Fuleli Canals Division.

Extensions and Improvements.

All the bunds in the Circle were maintained in good order at a cost of Rs. 1,79,088 inclusive of work-charged establishment. Of this a sum of Rs. 2,500 was spent in Hyderabad Canals Division, Rs. 48,798 in the Nasrat Canals Division and Rs. 1,27,790 in the Fuleli Canals Division.

Maintenance and Repairs.

The total mileage of Bunds in Hyderabad Canals Division is 5 miles, in Nasrat Canals Division 66 miles and in the Fuleli Canals Division 46 miles.

General Remarks.

93. The expenditure on and receipts from gardens during the year are compared below with the figures of the previous triennium :—

Expenditure on and receipts from gardens.

Years	Expenditure on maintenance	Receipts	
		As estimated	Actual
	Rs.	Rs.	Rs.
1926-27	9,752	2,080	1,467
1927-28	9,939	2,047	1,914
1928-29	10,221	2,513	1,433
1929-30	9,842	2,450	702

PLANTATIONS

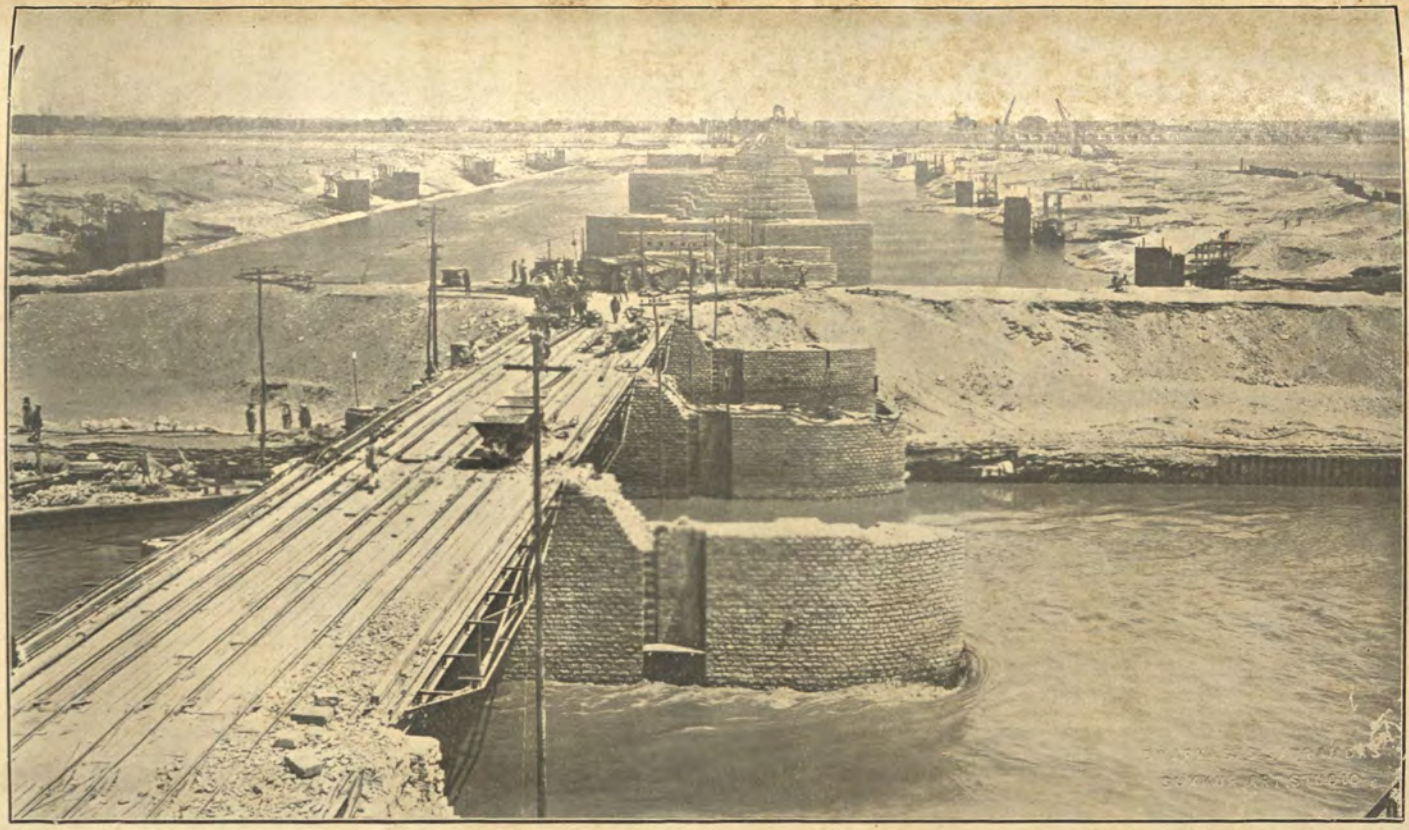
94. During the year about 6,776 new trees of various kinds other than babul were planted along canals and in gardens and nurseries, of which 6,208 were alive at the end of the year. Besides these about 3,421 babul trees were also planted along canal banks and river embankments.

4. LLOYD BARRAGE AND CANALS CONSTRUCTION

GENERAL REMARKS

95. The scheme consists of a Barrage or Weir across the river Indus, three miles below the gorge at Sukkur, with three canals on the Right and four on the Left Bank taking off therefrom, each with a separate Head Regulator. It is divided into 5 Circles of Superintendence with a Chief Engineer at the head. One Superintending Engineer is in charge of the construction of the Barrage with the River Training Works, the Head Works of the main canals and Khairpur Feeder West while the remaining Superintending Engineers are in charge of the construction of Canal systems.

96. The year under report is the 5th full working year for the execution of the scheme and was remarkable for the almost unprecedented height of the river Indus and the excessive rainfall—in the Province of Sind. These dual calamities had an adverse effect on the progress of the works. Everything possible was done to minimise



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LLOYD BARRAGE

View of the work inside the Barrage cofferdam of season 1929-30 taken from the top of pier on Left Bank.

the damage caused by the floods to the works, and after the floods subsided every endeavour was made to make up for time lost.

Lloyd Barrage Circle

97. *Progress on the Barrage proper.*—Before the abkalani the under-water work of the 1928-29 season, consisting of 10 spans on the Right Bank from spans Nos. 6½ to 16½, and 13 spans on the Left Bank from spans Nos. 43½ to 56½ was completed. The floor masonry and aprons were completed and all piers were carried above the flood level.

Simultaneously with the work inside the Cofferdam, work was contiuued on the superstructure and arch work of the spans of which the under-water work had been completed in the previous season, viz. the Regulators on each Bank and the Barrage spans Nos. 1 to 6 on the Right Bank and spans Nos. 58 to 66 on the Left Bank. Both the Road and Gate Bridge arches in spans Nos. 1 to 5 (scouring sluices) on the Right Bank and Nos. 60 to 66 on the Left Bank were completed, their haunches were filled and the masonry carried up to the road level.

After the abkalani, when the level of the river had sufficiently subsided, the construction of the Cofferdam for the 1929-30 season's work was commenced. The Cofferdam was the largest ever constructed, enclosing an area of 46 acres and in this Cofferdam the construction of under-water work of the remaining 27 spans of the Barrage was begun, and great progress was made by the end of March 1930. The following table gives the principal items of work done in the Cofferdam :—

	Right Bank	Left Bank
	Lacs c. ft.	Lacs c. ft.
Excavation by Dredger ..	37	45
Excavation by hand	33·70	33
Floor Masonry	6·75	6·37
Pier Masonry	0·47	0·49
Concrete Paving	0·70	0·53
Pitching	4·20	6·00
Piling	51,800 sq. ft.	56,600 sq. it.

Canal Head Regulators.—Except for cut stone work, very little remains to be done on the Right Bank Regulators. This work is going on intermittently as opportunity offers. On the Left Bank Regulators the haunch filling of the Gate Bridge Arches was completed, and the cut stone work in the pilaster caps and the parapets of the connecting walls made good progress. The cement concrete pavement of the downstream apron of the Rohri Canal was taken in hand and all cement concrete blocks in the apron of the Khairpur Feeder West were laid.

Railways.—To facilitate the execution of the works, a net work of railway track, with numerous sidings at the stone quarries and cofferdam, were maintained in serviceable condition and new sidings were laid at the quarries, cofferdam and the works area as found necessary.

Fleet.—The floating craft consisting of 2 Suction Dredgers, Paddle Tugs, Pontoons for pile driving plant, floating pumping sets and Electric

Cranes, Heave-up boats, steel barges, motor launches, etc., were kept busy throughout the year.

Quarries.—The stone manufactured during the year under report was as follows :—

Completely dressed stone ..	99,026 c.ft.
Incompletely dressed stone ..	38,816 c.ft.
Rough stone blocks	56,529 c.ft.
Other stone	56,31,138 c.ft.

Kilns of continuous and intermittent type for the manufacture of fat and hydraulic lime were fully employed and the lime manufactured was used in preparing lime mortar for the Barrage and Regulators.

Canal Circles

98. The work done consisted of further survey and alignment of channels, excavation by dragline excavators and manual labour of main canal and branches, construction of Regulators, Bridges etc. The total length of the main canal, branches and distributaries is 6,181 miles of which 3,077 miles comprising most of the widest canals were completed. The quantity of earthwork done and to be done in various Circles are as under :—

Name of Circle	Work done	Work remaining to be done
	Crores c.ft.	Crores c.ft.
North Western Circle	71	32
Western Circle	71	25
Rohri Canal Cricle	148	92
Eastern Nara	70	55

General Items

99. The Central Designs Division, which is under the direct control of the Chief Engineer, was mainly engaged on the designs of Regulators, Jack Arch and Steel Bridges, and on carrying out experiments on the models of designs for Regulators, Hume Pipe Culverts, Syphons, etc., with a view to checking the designs in the light of information obtained from the experiments.

A well equipped Hospital on the Right Bank and a Dispensary on the Left Bank, as well as dispensaries at several places on the canals established for the treatment of staff and labour employed on works at Sukkur and on the Dragline Excavators, proved most useful.

The rectangulation survey of the area under the command of the canals of the Scheme was continued by the Survey of India at the expense of this project.

During the year under report the works at Sukkur were visited by His Excellency the Governor of Bombay, His Excellency the Commander-in-Chief in India, by the Royal Commission on Labour in India, the Honourable the General Member and the Honourable the Finance Member, the Honourable Mr. Mudaliar, Minister, Madras, the Chief Engineer, Roads and Buildings, Madras Presidency, and a large number of other distinguished gentlemen.

LLOYD BARRAGE — SUKKUR

Panoramic view inside Cofferdam looking downstream. Showing in progress masonry floor & aprons of Barrage, & piers for the last 27 Spans in the cen
The Cofferdam, is 2,370 ft. long & 850 ft. wide. 14 completed spans of superstructure on the right flank & 16 on the left flank are just vi
in the picture.

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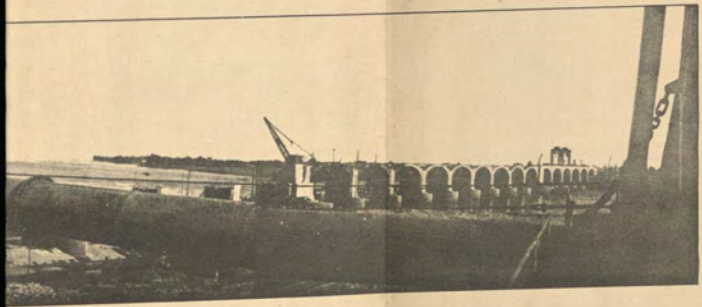
sible

LLOYD BARRAGE — SUKKUR

Panoramic view inside Cofferdam looking downstream. All floor masonry & Aprons upstream & downstream completed. & Piers built up to



flood level

5. INDUS RIVER COMMISSION

100. The expenditure on all the works including surveys carried out under the direct supervision of the Chief Engineer in Sind during the year under report was charged to "15-Other Revenue Expenditure financed from Ordinary Revenues—Works for which neither Capital nor Revenue Accounts are kept ".

Survey of the Indus

101. The main course of the river commencing at a point opposite Rojhan above Kashmor down to the bifurcation at the delta was surveyed and plotted. The total length of the traverse survey done during the year was 879 miles as compared with 939 miles last year.

Demarcation and Maintenance of District and States Boundaries

102. The demarcation of the boundary between Upper Sind Frontier and the Bahawalpur State was carried out. The Khairpur State boundary was maintained by clearing British side range lines. A portion of the work in connection with surveying and marking the district boundaries, rails and pointers on the different deh maps in the riverain area from Kashmor to Kotri was also completed.

Gauge Readings

103. The daily gauge readings were taken along the river Indus at Mithankot, Doulatpur, Sukkur, Kotri, Mehrani, Hajipur, Jherruck, Gharo and Panjgazo.

Discharge Observations

104. Daily discharges of the Indus were taken at the following places :—

Serial No.	Name of site	For measuring discharge of	Situation	Frequency of observations
1	Sind ..	Indus above Mithankot Confluence	Near Daka village ..	Daily except from 1st June to 21st October.
2	Panjnad ..	River Panjnad above Mithankot Confluence.	Do. ..	Daily except for 7th August to 16th August and 28th August to 27th September.
3	Mithankot ..	Indus ..	Mithankot town ..	Daily except for 1st June to 26th September.
4	Sukkur ..	Do. ..	Near outfall gauge.	Daily.
5	Kotri ..	Do. ..	1 mile below Railway Bridge.	Daily.
6	Jherruck ..	Do. ..	Near Raju-jo-Goth upto 31st August 1929 and thereafter near Tikhar village and Hajipur gauge.	Daily.

The discharges were also observed at Nara, Khairpur, Chariowah, Jamshoro for Eastern Nara channel, Khairpur Canals, Mulchand dhand and Fuleli Canal respectively.

105. The discharge observations at all the sites are made with the help of rack rod and pinion arrangement by which the accurate lowering of meter to a particular depth has become very easy and quick. The innovation which was first introduced by the Indus River Commission during the year 1927-28 has become extremely popular and the Punjab Government also have accepted its introduction at certain sites in that Province. The apparatus is manufactured at the Kotri Workshop in different sizes to suit the force of current during the cold and hot weather seasons, the lightest size, being 2″ × ½″ and the heaviest one 2½″ × 1″.

Scientific Works and Discharges of the Indus

106. The discharge and other scientific observations were continued at Sukkur and Kotri as usual, the results of which will be published in the Indus River Commission Records. The total monthly discharge at Sukkur during the innundation season and the maximum, minimum and average discharges of the year, compared with the results of the previous four years, are as follows, rounded to 3 or 4 significant figures :—

Month	1925-26	1926-27	1927-28	1928-29	1929-30
June* ..	7,190,000	5,010,000	4,120,000	9,171,000	5,720,000
July* ..	13,180,000	8,560,000	9,880,000	11,102,000	7,900,000
August* ..	15,100,000	14, 00,000	14,5 0,000	10,348,000	15,340,000
September* ..	5,830,000	10,750,000	6,310,000	7,820,000	10,640,000
Total ..	41,300,000	39,220,000	34,860,000	38,441,000	39,600,000
Average discharge ..	338,000	321,000	286,000	315,000	325,000
Maximum discharge ..	645,000	607,000	625,000	447,000	702,000
Minimum discharge June to September.	107,000	123,000	95,300	108,400	93,000
Minimum discharge observed throughout the year.	24,800	25,500	27,000	30,500	33,700

* Totals of average daily discharges.

107. *Fleet.*—The S.L. " Witch " was overturned by a strong gale helped by a land slip near Mithankot on 10th September 1929 and sank. Repairs were carried out to S.L. " Madge," S.L. Hussaini, M.L. " Dorothy " and M.L. " Margaret ".

Work in connection with High Floods

108. The inundation of 1929 was the highest recorded for many years past and created entirely a new record for Lower Sind. The situation was greatly aggravated by the sustained torrential rains in the Punjab and Sind and great anxiety was felt by all concerned for the safety of the river bunds and canals from about 15th August to 10th September 1930. The Indus River Commission had to take its own share of this general strain and some of the special precautions which were taken in this connection are enumerated below :—

(*a*) Bukkur gauge and Sukkur Gauging Sub-divisional office were connected with the telephone exchange, Sukkur, and readings of the Bukkur and other Sind and Punjab gauges were supplied to all officers and the public, enquiring about them, throughout the 24 hours of day and night.

(*b*) The gauges at Mithankot, Bukkur and Kotri were read every 3 hours during day and night.

(*c*) The discharges of all the bridges under the Railway line from Rohri to Daharki were daily observed from 5th to 14th September to arrive at the actual figure of flood discharge through the openings of the Railway Bridge.

109. *General items.*—(1) A new type of copper silt cup for taking out samples of water from desired depths of the river was introduced during the year under report.

(2) An English cutter has been introduced at discharge site Kotri for winter observations. The observations obtained with the cutter are more accurate and less costly.

Extensions and Improvements and special repairs

110. The estimated cost of the works under these heads sanctioned or approved during the year 1929-30 by the Indus River Commission for execution by the Executive Engineers or by the Indus River Commission is as follows :—

Division	Extensions and Improvements	Repairs	Total
Indus Right Bank Circle	Rs.	Rs.	Rs.
Begari Canals	49,383	21,865	71,248
Shikarpur Canals	29,320	1,35,955	1,65,275
Ghar Canals	30,258	1,63,340	1,93,598
Western Nara	1,47,621	91,219	2,38,840
Karachi Canals	20,262	49,257	69,519
Total ..	2,76,844	4,61,636	7,38,480

Division	Extensions and Improvements	Repairs	Total
Indus Left Bank Circle			
Fuleli Canals	74,065	....	74,065
Nasrat Canals	79,520	11,051	90,571
Total ..	1,53,585	11,051	1,64,636
Indus River Commission			
Karachi Buildings Division ..	8,500	....	8,500
Grand Total ..	4,38,929	4,72,687	9,11,616

Works under the direct control of the Indus River Commission

111. The total expenditure incurred and accounted for was :—

	Rs.
Works	8,534
Repairs	45,053
Tools and Plant	3,397
Grand Total ..	56,984

Erosion

Begari Canals Division

112. Very heavy erosion started at the head of the new feeder to the Desert Canal and resulted in the silting up of the feeder.

Shikarpur Canals Division

113. The erosion opposite mile 27-28 of the Sukkur Begari Bund continued but the country behind this portion is already protected by the new Satabani Loop.

Ghar Canals Division

114. Erosion started opposite miles 14-17 of the Saidabad Jhalli Bund in June 1929 but after being very active has ceased for the present. The bund is still far off.

Western Nara Division

115. The erosion opposite the Abad Bund mile 11/5 to 13/0 continued but it has not been necessary to construct the emergency loop as the erosion moved downstream and has since practically stopped.

No. P-196-B.

REVENUE DEPARTMENT.

OFFICE OF THE COMMISSIONER IN SIND :

Government House, Karachi,
25th May 1931.

Subject.—Irrigation Administration Report, Part II, Sind—1929-30.

MEMORANDUM.

The Commissioner in Sind presents compliments and in continuation of his endorsement No. P-196-B, dated the 22nd April 1931, on the subject noted above, has the honour to submit the following remarks together with a comparative statement showing the area irrigated and the assessment levied thereon in each of the three years ending 1929-30 and the average for the preceding three years.

2. The season under report was far from satisfactory. At the start of the inundation period the river was very low. The level at the Bukkur gauge was 11·1 feet for the first time on 17th June 1929, but then quickly declined and fell to 8·5 feet on the 24th June 1929. Thereafter it fluctuated between the abnormally low levels of 8·0 and 9·4 feet up to 16th July 1929, the result being that transplantation of rice was greatly impeded, and other agricultural operations were retarded to a considerable degree. After 16th July, however, the river continued to rise steadily and reached an abnormal height in August and September, causing serious floods. The fair irrigating level of 13 feet was attained at the Bukkur gauge on the 25th July 1929, and the river remained at this or higher levels for 49 days during the season ; as against 11 days in 1928, 21 days in 1927, 44 days in 1926 and 25 days the average of the last three years. The fair irrigating level of 17 feet on the Kotri gauge was first reached on the 27th July 1929 and was maintained for a period of 58 days as compared with 85 days in 1928, 47 days in 1927, 68 days in 1926 and 67 days the average of the last three years. The highest readings of the year were 17·7 feet on the 6th September 1929 at Bukkur and 24·1 feet on the 13th September 1929 at Kotri ; as compared with 14·2 feet on 1st August and 19·3 on the 6th August in the preceding year ; and the greatest height ever recorded 17·9 and 23·8 respectively. The level at Kotri was thus the highest on record, while that at Bukkur approached very close to the previous record.

The year moreover witnessed an unprecedented amount of rainfall. There were three separate heavy downpours within the course of one month and a half. These rains combined with the high river in August and September, brought about at first by the bursting of the Shyok dam and subsequently by heavy rainfall in the Punjab, caused serious floods all over the country, specially in Thar Parkar, Hyderabad, Nawabshah and

Upper Sind Frontier Districts. The river at Attock, this year, attained a maximum height of 66·5 feet, a height which had only once before been reached in modern history. The heavy rainfall and high river and the consequent breaches in the river and canal banks caused widespread destruction of kharif crops and severe losses of cattle, and the ruin of houses and other property.

In the province as a whole there has been an increase of nearly 5 per cent. both under cultivation on canals and assessment from 32 lakhs to 33½ lakhs of acres, and 104 to 109 lakhs of rupees, respectively.

3. The figures of cultivation for the two circles as compared with the figures of 1928-29 and the average of the three years ending 1928-29 are given in the sub-joined statement.

	As compared with 1928-29		As compared with the average of the three years ending 1928-29	
	Kharif	Rabi	Kharif	Rabi
Indus Right Bank Circle	+57,000	+41,000	+1,31,000	+37,000
Indus Left Bank Circle	+1,00,000	−7,000	+93,000	+1,000

4. There was a total increase of 262,000 acres in the area under cultivation as compared with the average of the previous triennium.

5. Remissions of land revenue amounted to Rs. 22,29,000 as against Rs. 4,32,000 in the previous year and Rs. 7,75,000 the average of the preceding three years. Of the total remissions Rs. 8,60,000 were due to floods and erosion, Rs. 5,38,000 due to breaches of canals, Rs. 3,86,000 due to frost and adverse winds and Rs. 3,31,000 due to damage caused by rats, locusts and insects as against Rs. 1,000, 4,000, 2,29,000, 57,000 respectively in the previous year. The other principal causes of remission were as under :—

	Rs.
(*a*) Deficiency of water supply	82,000
against, in the previous year	1,15,000
(*b*) Kalar	12,000
against, in the previous year	17,000

6. The outstanding balance of land revenue at the end of the year amounted to Rs. 7,61,000 (Rs. 2,48,000 in the Right Bank Circle and Rs. 5,13,000 in the Left Bank Circle) as against Rs. 3,08,000 in the preceding year and Rs. 3,71,000 the average of the last triennium. The increase is due to a great extent to liberal postponements granted in Thar Parkar, Hyderabad and Karachi districts on account of heavy damage caused by floods, rains, locusts, and frost.

7. The following statement gives details regarding the principal items of expenditure incurred on new works in connnection with the several canals :—

Name of Canal	Name of Work	Amount
		Rs.
Sind Canal	.. Improvements and other minor works ..	17,000
Mahi wah	.. Remodelling the Kander Branch ..	20,000
Fuleli Canal System	.. Constructing Cross Regulator over Shadiwah large, remodelling and moduling Sani Guni, Ghar Kadhan, Sherwah large, Alibahar Karo, Aliwah large, Fuleli Canal mile 70/3 to tail, constructing intermediate regulator at mile 70/3, and constructing distributaries on the Fuleli Right and Left Banks.	3,15,000
Jamrao Canal	.. Improvements to Nara Supply Channel and on raising and strengthening banks.	1,15,000
Eastern Nara System	.. Improvements to the Nara Supply Channel and other improvements.	1,13,000

In addition to the above expenditure, a sum of Rs. 1,79,000 was spent on constructing he proposed extension of Kassimpur Bund, constructing wetting bunds for feeding wetting channels, on the Beechanjee and Garang Loops and constructing regulator at Head, constructing a wetting channel on the Nara Bunds in the Pritchard Sub-division, constructing a new sluice in the Sukkur Begari Bund, constructing a bund from Taki 70 of the New Cut Begari to Mile 0/2 of the 1896 Loop with side slopes, and on surveying the Indus River. A sum of Rs. 2,13,000 was moreover spent on raising and strengthening and improving the following bunds and the works connected therewith :—

(1) Right Bank of Koraiwah.

(2) Nara bunds in the Pritchard Sub-division.

(3) Bunds in the Hyderabad, Nasrat and Fuleli Canals Divisions.

8. The subjoined statement shows the amount spent on the maintenance and repairs in the year under report as compared with that spent in the previous year and the average of the three years ending 1928-29 :—

Circle	1929-30	1928-29	Average of the three years ending 1928-29
	Rs.	Rs.	Rs.
Indus Right Bank Circle ..	40,03,000	39,87,000	36,16,000
Indus Left Bank Circle ..	26,10,000	22,95,000	22,78,000

Out of th's, he ac'ual expenditure on clearance and repairs was as follows :—

Circle		1929-30	1928-29	Average of the three years ending 1928-29
		Rs.	Rs.	Rs.
Indus Right Bank Circle	..	24,80,000	22,74,000	22,14,000
Indus Left Bank Circle	..	12,44,000	9,28,000	9,92,000

R. E. GIBSON,
Commissioner in Sind.

To

The Secretary to Government, Public Works Department, Bombay.

Statement showing cultivated area and assessment of Government, jagir and Foreign lands for years 1927-28, 1928-29 and 1929-30 together with the average of three years ending 1928-29

(Area in acres)

Year	Indus Right Bank Circle			Indus Left Bank Circle			Total		
	Kharif	Rabi	Total	Kharif	Rabi	Total	Kharif	Rabi	Total
1927-28 ..	1,260,240	274,669	1,534,909	1,247,537	190,986	1,438,523	2,507,777	465,655	2,973,432
1928-29 ..	1,351,963	352,213	1,704,176	1,262,167	204,862	1,467,029	2,614,130	557,075	3,171,205
1929-30 ..	1,408,782	393,537	1,802,319	1,361,846	197,994	1,559,840	2,770,628	591,531	3,362,159
Average of 3 years ending 1928-29	1,277,468	357,238	1,634,706	1,268,840	196,932	1,465,772	2,546,308	554,170	3 100,478

Assessment in rupees

Year	Total assessment in the Indus Right Bank Circle	Total assessment in the Indus Right Bank Circle	Total of the two circles
	Rs.	Rs.	Rs.
1927-28	55,25,573	41,00,186	96,25,759
1928-29	60,90,348	43,16,268	1,04,06,616
1929-30	62,99,021	46,06,393	1,09,05,414
Average of 3 years ending 1928-29.	57,65,464	42,56,750	1,00,22,214

Administration Report of Irrigation Works in Sind for 1929-30.

GOVERNMENT OF BOMBAY.

PUBLIC WORKS DEPARTMENT.

Resolution No. P. 22/14496.

Bombay Castle, 21st October 1931.

RESOLUTION OF GOVERNMENT

This Report has been prepared on new lines in accordance with the orders in Government Resolution No. 2209/27, dated 21st November 1929 and deals with the existing irrigation works in Sind and the Lloyd Barrage and Canals Construction Scheme which is under construction.

EXISTING IRRIGATION WORKS

2. *Inundation.*—Up to the middle of July the river was low but it maintained a high level during the remainder of the season which met the general requirements of irrigation adequately. The year under report witnessed an unprecedented amount of rainfall. The heavy rain combined with the abnormally high river in August and September brought about by the bursting of the Shyok dam caused serious floods all over the country.

3. *Cultivation.*—The area irrigated during the year was 3,362,159 acres showing an increase of 190,954 acres or 6 per cent. over the figure for the previous year. This is exclusive of 442,879 acres of Dubari or twice-cropped land.

4. *Financial results.*—The financial results of the year based on actual receipts and expenditure are given below :—

	Gross Revenue	Working expenses	Net revenue
	Rs.	Rs.	Rs.
55-Construction of Irrigation, Navigation, Embankment and Drainage Works not charged to Revenue—A-Irrigation Works—			
1. Productive	61,91,566	37,24,719	24,66,847
2. Unproductive	14,59,929	17,27,752	—2,67,823
Total ..	76,51,495	54,52,471	21,99,024*
15-Other Revenue Expenditure financed from ordinary Revenues—(2) Works for which neither capital nor revenue accounts are kept	1,92,487	18,94,554	—17,02,067
Grand Total ..	78,43,982	73,47,025	4,96,957

* Inclusive of share due to old irrigation.

The following table compares the receipts and expenditure of the year with those of the previous three years :—

Year	Gross revenue	Working expenses	Net revenue
	Rs.	Rs.	Rs.
1926-27	89,46,433	66,49,104	22,97,329
1927-28	78,02,396	71,11,077	6,91,319
1928-29	95,89,661	70,13,433	25,76,228
1929-30	78,43,982	73,47,025	4,96,957

The fall in revenue is due to heavy remissions granted during the year.

5. The capital invested in existing works for which capital accounts are kept up to the end of the year under review was Rs. 4,49,09,889 made up as under :—

	Rs.
Productive	1,94,16,324
Unproductive	2,54,93,565
	4,49,09,889

The net receipts on Capital works amounted to Rs. 16,09,164 which gives a return of 3·58 per cent. on the capital invested. The percentages of the previous three years were as under :—

1926-27	.. 7·52
1927-28	.. 4·80
1928-29	.. 7·68

6. The rate of working expenses per acre irrigated was Rs. 2·18 against Rs. 2·21 in the previous year. The details are given below :—

Total area irrigated by all classes of works	Total working expenses and maintenance of canals	Rate of working expenses per acre irrigated (col. 2÷ col. 1).	Expenditure on works for which neither Capital nor Revenue Accounts are kept	Rate of expenditure on Works for which neither Capital nor Revenue Accounts are kept per acre irrigated (col. 4÷col. 1)	Total working expenses per acre irrigated including expenditure on works for which neither Capital nor Revenue Accounts are kept (columns 3+5)
1	2	3	4	5	6
Acres	Rs.	Rs.	Rs.	Rs.	Rs.
3,362,159	54,52,471	1·62	18,94,554	0·56	2·18

7. The net consolidated assessment per acre on Government land in the Indus Right Bank Circle was Rs. 3·29 against Rs. 3·59 of the previous year. In the Indus Left Bank Circle it was Rs. 2·07 against Rs. 3·01 of the previous year.

8. The value of crops grown was Rs. 8,05,96,027 which shows a decrease of Rs. 248 lakhs as compared with the figure for the previous year.

LLOYD BARRAGE AND CANALS CONSTRUCTION

9. The progress made on this scheme since the commencement of work in 1923 has been satisfactory. Of the total length of 6,181 miles of main canals, branches and distributaries, 3,077 miles comprising most of the widest canals were completed. On the Barrage proper the major portion of the under-water work was completed. Considerable progress was also made on the superstructure work and Canal head regulators and it is expected that the Barrage will be ready to function early in 1932. The total expenditure incurred on the Scheme to end of March 1930 amounted to Rs. 12·5 crores.

By order of the Governor in Council,

T. A. ANDREW,
Deputy Secretary to Government,
Irrigation and Railways.

To

The Finance Department.
The Revenue Department.
The Commissioner in Sind.
The Commissioner, Northern Division.
The Commissioner, Central Division.
The Commissioner, Southern Division.
The Chief Engineer, Lloyd Barrage and Canals Construction.
The Chief Engineer in Sind.
All Superintending Engineers of Circles.
The Revenue Officer, Lloyd Barrage and Canals Scheme.
The Settlement Commissioner and Director of Land Records.
The Director of Agriculture.
The Director of Information.
All Collectors in Sind including Deputy Commissioner, Upper Sind Frontier.
The Accountant General, Bombay.
The Audit Officer, Lloyd Barrage and Canals Construction.
All Executive Engineers in charge of Irrigation Works in Sind.

BOMBAY: PRINTED AT THE GOVERNMENT CENTRAL PRESS.

INDEX MAP
OF
SIND
to accompany the Irrigation Administration Report,
Part II, Sind.
1929-30
Scale of Miles
REFERENCES
Canal Distrct Boundaries shown thus
Canals
Railway line
Bunds
Under construction
River gauges R.G
Rain gauges
JACOBABAD
Kandkot
Shikarpur
Garhi Yasin
Shahdadkot
Ratodero
Miro Khan
SUKKUR
Rohri
KHAIRPUR
LARKANA
Mehar
Khairpur Nathesham
Kandiaro
Naushahro Feroz
Dadu
Moro
Sehwan
Manchhar Lake
NAWABSHAH
Lakhi
Sakrand
Jhol
Manjhand
Shahdadpur
Tando Adam
Sinjhoro
Tando Allahyar
HYDERABAD
Matiari
Tando Jam
Kotri
Jamshoro
Thana Bula Khan
Tando Bago
KARACHI
Jerruck
Tatta
Mirpur Sakro
Shah Bunder
Keti Bandar
Badin
Mugalbin
Ladiun
Allahbakhsh Soomro
Jhimpir
Gharo
ARABIAN SEA
NASRAT CANALS
KHAIRPUR CANALS
BEGARI CANALS
RAJPUTANA STATE
KHAIRPUR STATE
NAWABSHAH
HYDERABAD
THARPARKAR
UMARKOT
Chachro
Mirri
NAGAR PARKAR
RANN OF CUTCH
CUTCH
CUTCH

Digitized by Arya Samaj Foundation Chennai and eGangotri

MAP OF SIND

SHOWING

ALL AREAS IRRIGATED BY EXISTING INUNDATION CANALS.

TO ACCOMPANY THE IRRIGATION ADMINISTRATION REPORT, PART II, SIND 1929-30.

Scale 28 Miles = 1 Inch.

Average annual cultivation.
In whole of Sind 3,520,000 acres.
In barrage canals zone 2,035,600 ac.

G.R.Z.O. Poona, 1931.

PLAN OF SIND.

SHOWING

ALL AREAS TO BE IRRIGATED

BY

LLOYD BARRAGE AND NEW CANALS

AND

EXISTING CULTIVATION IN AREAS

NOT COMMANDED BY BARRAGE.

TO ACCOMPANY THE IRRIGATION ADMINISTRATION REPORT, PART II, 1929.

1929—30.

SCALE 30 MILES=1 INCH.

N

E

REFERENCES.

British and State Boundary

Barrage Canals

Existing Canals Proposed to be Utilized

Barrage Irrigation Boundary

Existing Canals

Perquisite Grants

Khariff do.

Existing Areas not Commanded by Barrage

DETAILS OF CULTIVATION:—

	ACRES
Present Average Annual Cultivation in Barrage Zone	2,925,681
* Final Estimated Annual Cultivation in Barrage Zone	5,189,900
+ Present Average Annual Cultivation in whole of Sind	2,515,900
Final Estimated Annual Cultivation in whole of Sind after full development of New Canals	6,589,900

* Exclusive of the Area to be irrigated in the Khairpur State but including an Irrigation in the Nawabshah Taluqa of Kalat Territory

+ Includes 10,431 Acres of Kalat Territory irrigated by the Sind P.W.D.

E. Evans

Executive Engineer,
for Chief Engineer,
Lloyd Barrage & Canals Construction.

ARMY PHOTOGRAPHIC OFFICE, POONA, 1931.